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THE ALKALOID EPHEDRINE*

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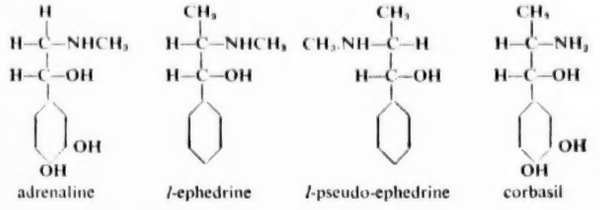
The alkaloid ephedrine is present in extracts of various plants belonging to the genus *Ephedra*, which all grow in roughly the same latitude in Northern China, Northern India, and Spain. One species has been used as a drug in China for about 5,000 years under the name of "ma huang." The plant consists almost entirely of bundles of green stems lying parallel without much branching. The leaves are reduced to small dry scales arranged in twos or threes round the stem at intervals, so that the plant looks rather like an equisetum. In actual fact the ephedras are gymnosperms, and are therefore related to the pines and firs, whereas the equisetums are not flowering plants at all, and are very distant relations of the ephedras.

The chemical structures of ephedrine and pseudo-ephedrine are here shown. These alkaloids, both of which



are present in the green stems of some kinds of ephedra, are optical isomers of one another and closely related to adrenaline. The molecules of ephedrine and pseudo-ephedrine each contain two asymmetric carbon atoms. There are therefore four optical isomers. The two laevorotatory isomers are included in the formulae given here. The dextro-isomers are the mirror images of these. The difference between ephedrine and pseudo-ephedrine depends on the position of the two asymmetric carbons relative to one another, and is represented graphically by drawing $-NHCH_3$ and $-OH$ near to one another in the case of ephedrine and opposite to one another in the case of pseudo-ephedrine: *l*-ephedrine and *d*-pseudo-ephedrine are the natural isomers, and are more active pharmacologically than the other isomers.

Early References to Ma Huang

The history of scientific work with ephedrine is shown graphically in the chart, which is based on a bibliography by B. E. Read showing all the papers on the subject up to 1934. The rate at which papers on ephedrine appeared is plotted against time. The first pharmacological experiments were carried out in China in 2760 B.C. by the Emperor Shen Lung, who tasted all the drugs in the pharmacopoeia and classified them accordingly. Ma huang was classified as a "medium" drug. The next surviving reference was published about 2,500 years later. This represents a big gap in the literature, but it is probable that many references from this period have been lost. After the beginning of the Christian era the rate of publication increased from about one paper per century to four papers a century in the period 1500 to 1880.

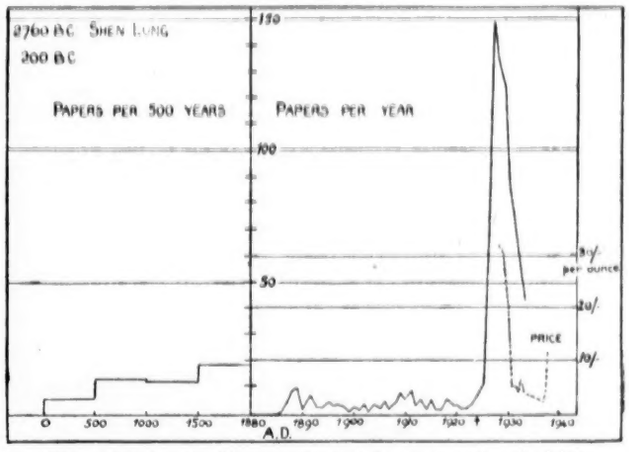


Chart showing the history of scientific work with ephedrine.

A famous pharmacopoeia written in China in A.D. 1596 says that ma huang is of use as a circulatory stimulant, diaphoretic, antipyretic, and sedative in cough. Modern observations confirm most of this. Ephedrine does stimulate the circulation under certain conditions, and has been found beneficial in whooping-cough. Its diaphoretic effect has been observed in man, but attempts to demonstrate it in animals have been unsuccessful.

Modern Literature

After 1880 the rate of publication increased so rapidly that it is necessary to plot the results on a different scale.

Ephedrine was isolated by the Japanese worker Nagai (1887) and given the name by which it is known to-day. Pharmacological investigations showed that large doses had toxic effects, and ephedrine acquired a reputation as a dangerous poison. Its mydriatic action was discovered and studied in detail. Takahashi and Miura (1892) came to the conclusion that ephedrine dilated the pupil by stimulating the sympathetic nerves. It is remarkable that they should have reached this conclusion so long ago, before anything was known about adrenaline, or even about the properties of suprarenal extracts. The only other substance they knew of as a drug acting similarly was cocaine. At about this time ephedrine was put on the market in Europe as a mydriatic. It was apparently not employed for other purposes, and its use soon died out. For many years little research was done except by chemists, who worked out the details of the chemical structure and had synthesised all the optical isomers by 1920.

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The pharmacology of ephedrine was reinvestigated in Japan by Amatsu and Kubota in 1917. It was shown to have sympathomimetic effects like those of its chemical relative adrenaline. Ephedrine was put on the market in Mukden as a remedy for asthma, but since the results were published in Japanese they attracted no attention in the Western world, and were even unknown to Chen and Schmidt when they started to work on ma huang in 1923. A Chinese druggist told them that this was a really active drug, and would be likely to prove interesting. They therefore made extracts of the plant, injected them into dogs, and observed the resulting rise of blood pressure. They isolated the alkaloid and showed that it had adrenaline-like properties before they discovered that ephedrine had been isolated and studied before. Nevertheless this work of Chen and Schmidt had a very important effect, because it aroused interest in ephedrine and stimulated the production of papers. Their original paper was published in America in 1924. By 1927 the rate of publication had risen from less than ten papers per year to about 150. Thereafter the rate slowly fell, but more papers are still produced each year than before Chen and Schmidt's article appeared.

Ephedrine provides an example of the practical application of pharmacological discoveries in clinical medicine. It is interesting to note that fundamental observations on its action were made on three separate occasions before they caught the imagination of the world. Once the imagination was caught the demand for ephedrine was great, and the world now consumes about ten tons a year —corresponding to about 1,000 tons of ma huang.

Synthetic ephedrine was introduced in 1927—the year when interest in ephedrine was at its height—under the name of ephetonin. This preparation consists of a racemic mixture of the two optical isomers, and is therefore slightly less active than the natural laevo-ephedrine. Competition brought the price down from 33s. 4d. an ounce in June, 1929, to 5s. 10d. an ounce a year later and 2s. 6d. in 1936. Thousands of tons of ephedra were exported from China, India, and Spain, mainly to America, where very large stocks are held now; and someone must be making a lot of money, because the wars in Spain and China have sent the price up to about 12s. an ounce. Synthetic ephedrine has thus come into its own, and it has become economically possible to sell synthetic laevo-ephedrine, which is presumably equivalent in all respects to the natural product. This fact has probably kept the price of natural ephedrine from rising still higher.

The Pharmacological Effects of Ephedrine

The pharmacological effects of ephedrine resemble those of adrenaline in many ways. For example, under suitable conditions ephedrine raises the blood pressure by constricting the blood vessels and stimulating the heart. It dilates the pupil, dilates the bronchi, inhibits the intestine, and raises the blood sugar. In large doses it has various other effects, which have been attributed to an indiscriminate stimulation of smooth muscle and to stimulation of autonomic nerve ganglia. I am not concerned with these effects now, nor with its action on the central nervous system, but with the adrenaline-like action of small doses. The actions of the two drugs resemble one another in many ways, but various differences have been noticed. I propose to give a list of these now and to discuss them more fully later.

1. Ephedrine is more stable and has a more prolonged action than adrenaline, and, unlike adrenaline, it is effective when given by the mouth.

2. Section of the sympathetic adrenergic nerves to certain tissues, followed by degeneration, increases the effect of adrenaline and diminishes that of ephedrine. An injection of cocaine has similar effects.

3. Ephedrine has often been found to have much less action on isolated tissues than might have been expected from its effects in the body.

4. If the same dose of ephedrine is given repeatedly the effect diminishes with each successive dose. This is not true of adrenaline. This immunity lasts for only a few hours. Rabbits which have received injections of ephedrine every day for several months still react to ephedrine with a rise of blood pressure (Rühl, 1929).

It is evident that although the actions of ephedrine resemble those of adrenaline superficially, the two actions are not exactly the same, and various workers have come to the conclusion that the two drugs act on different parts of the sympathetic mechanism. I want to tell you of some new observations, and of a new theory which explains some of the peculiarities of the action of ephedrine.

The Cholinergic and Adrenergic Nerve Groups

Before discussing these new facts I propose to recall to your minds certain recent advances in our knowledge of the mode of action of motor nerve endings. Evidence has been advanced that most, if not all, motor nerves produce their effects by liberating a chemical substance at their ends. This chemical substance carries the impulse across the synapse and, by its pharmacological action, produces the effects which were formerly supposed to be produced by the nerve itself. Motor nerves can be divided into at least two classes according to the nature of the chemical substance liberated. Most motor nerves liberate acetylcholine, but some of them liberate adrenaline or a closely allied substance. Sir Henry Dale has suggested that the former group should be called cholinergic and the latter group adrenergic. These words supplied a real need and have spread all over the world.

Some years ago, when I was working in Sir Henry's laboratory, I helped to identify the substance liberated at cholinergic nerve endings as acetylcholine. Chang and I (1933) showed that, by suitable pharmacological tests, it was possible to distinguish acetylcholine from other choline esters, and then Feldberg and I applied these tests (1934) to the substance liberated in a sympathetic ganglion and identified it as acetylcholine, as distinct from other choline esters. Later similar results were obtained in experiments with other nerves, and more recently I have been trying to apply tests to discover whether or not the substance liberated by adrenergic nerves is adrenaline. This question is particularly interesting to us because the theory that nerves liberate adrenaline was first advanced by Professor T. R. Elliott in 1904. It is also particularly important because Cannon and Rosenblueth (1937) have presented evidence that two different substances are liberated on stimulating different kinds of adrenergic nerves. They believe that both substances are similar to adrenaline, but that neither of them is identical with it.

Substrate Competition

The experiments with acetylcholine were made much easier owing to the discovery that eserine (physostigmine) preserved acetylcholine from destruction in the body. In the absence of eserine the acetylcholine liberated at nerve endings was apt to be destroyed before it could be detected, but when eserine was added the acetylcholine was preserved and the experiments were successful. The enzyme which destroys acetylcholine is known as choline esterase, and it is probable that the eserine acts by combining with choline esterase and blocking it up (Easson and Stedman, 1936). The eserine molecule is in certain respects similar to the acetylcholine molecule, and choline esterase does not seem to know the difference. The molecules of enzyme combine with eserine, which is comparatively stable, and are therefore no longer free to devote them-

selves to the destruction of acetylcholine. This chemical phenomenon is known as substrate competition. A substance which would preserve adrenaline in the body in the same sort of way that eserine preserves acetylcholine might therefore be expected to facilitate experiments with adrenergic nerves as eserine has facilitated experiments with cholinergic nerves. Such a substance would probably be similar in chemical structure to adrenaline, but more stable. There is reason to believe that ephedrine acts in this way.

The adrenaline molecule may meet its end in various ways. The catechol group makes it unstable. In watery solution its tail curls up and becomes attached to its head, forming a red indole derivative. This change is inhibited by blood and is not the only fate of adrenaline in the body, which contains several enzymes capable of destroying adrenaline in different ways. Various workers have recently been drawing attention to one particular enzyme, known as amine oxidase, which destroys adrenaline, and various other amines, by removing the nitrogen. Blaschko, Richter, and Schlossmann (1937) have shown that ephedrine is not destroyed by amine oxidase, but that in the presence of ephedrine the enzyme is prevented from destroying adrenaline. They attribute this action, like that of eserine, to substrate competition.

These experiments of Blaschko, Richter, and Schlossmann were carried out with minced tissues, and the rate of destruction of adrenaline was calculated from measurements of the increased oxygen uptake due to adrenaline. The results clearly show the presence in certain tissues of an enzyme which destroys adrenaline, and which is inhibited by ephedrine. They throw no light on the part played by the enzyme in the body, but they show that if this enzyme should turn out to be the agent which destroys adrenaline when it has produced its effect, ephedrine would be likely to inhibit this destruction and play a part similar to that played by eserine at cholinergic nerve endings. My main purpose is to discuss the evidence for the theory that amine oxidase and ephedrine do in fact act in this way. This theory explains some of the peculiarities of the action of ephedrine, and I therefore propose to return to these peculiarities and discuss their relation to the theory.

Peculiarities of the Action of Ephedrine

In the first place, the fact that the actions of ephedrine are more prolonged than those of adrenaline might be explained on the theory that the action of adrenaline is normally controlled by the action of amine oxidase, and that ephedrine owes its prolonged action to its immunity to this enzyme. The prolonged action of ephedrine could, however, be explained in other ways, since ephedrine is normally resistant to other destructive agents besides amine oxidase.

In the second place, experiments on the effect of the degeneration of nerves confirm the theory that some of the actions of ephedrine resemble those of eserine. After degeneration of its nerve supply the pupil becomes more sensitive to acetylcholine and adrenaline, but much less sensitive to eserine and ephedrine. After degeneration of the nerves the liberation of chemical transmitters presumably ceases, so that substances whose actions depend on preservation of the transmitter naturally lose their effect. The action of small doses of ephedrine on the cat's nictitating membrane, on the other hand, is increased by degeneration of the nerves (Bülbring and Burn, 1937). In this case ephedrine presumably acts exactly like adrenaline.

The third peculiarity of ephedrine which I mentioned is the fact that it often has less action on isolated tissues than might be expected from its activity in the body.

Schaumann (1928) suggested that this difference might be due to the presence of adrenaline in the body and its absence in isolated tissues. He found that when adrenaline, in a concentration of one in ten millions, was added to the Ringer's solution perfusing a frog's legs the addition of a similar concentration of ephedrine caused marked vasoconstriction. In the absence of adrenaline these concentrations of ephedrine had no effect. Burn (1932) obtained similar results when dogs' legs were perfused with blood. Incidentally Schaumann observed that when high concentrations of ephedrine were added to perfusion fluid containing adrenaline the ephedrine caused vasodilatation. This observation falls in line with various others which show that *high* concentrations of ephedrine antagonize adrenaline. These observations led Schaumann to the discovery that the injection of ephedrine increased the effect of the subsequent injection of adrenaline on the blood pressure of rabbits and dogs. Similar results have been obtained by others. Csépai and Doleschall (1928) found that ephedrine increased the effect of adrenaline on the blood pressure of man. On the other hand, Curtis (1929) observed that large doses of ephedrine antagonized the effect of adrenaline on the blood pressure of dogs. Reinitz (1929) found that low concentrations of ephedrine increased the effect of adrenaline on the rabbit's uterus. High concentrations had the opposite effect. Pak and Tang (1933) discovered that the application of ephedrine to a rabbit's conjunctiva sensitized the pupil to the subsequent local application, or intravenous injection, of adrenaline. Kwiatkowski and I have recently seen similar effects in a frog's heart, a rabbit's ear, and a cat's nictitating membrane.

Low concentrations of ephedrine have thus been shown to increase the actions of adrenaline in much the same way that eserine increases the actions of acetylcholine. This effect of eserine is generally attributed to the inhibition of choline esterase, but so far as I know no one has suggested that the corresponding effect of ephedrine is due to the inhibition of an enzyme. Now that Blaschko, Richter, and Schlossmann have demonstrated the inhibition of amine oxidase by ephedrine *in vitro* the evidence is as complete in the case of ephedrine as it is in the case of eserine. The possibility of other explanations must, however, be borne in mind.

These results provide a new method of studying the mechanism at an adrenergic nerve ending. Eserine increases the action of cholinergic nerves, presumably by inhibiting the destruction of the acetylcholine which they liberate. Kwiatkowski and I have found that ephedrine has a similar action on the adrenergic nerves in a frog's heart, a rabbit's ear, and a cat's nictitating membrane.

The Effect of Ephedrine on Adrenaline and Adrenergic Nerves

I hope I have convinced you that, under appropriate conditions, ephedrine potentiates the actions of both adrenaline and adrenergic nerves. If this effect is due to the protection of adrenaline from destruction, ephedrine should increase the amount of detectable adrenaline liberated on stimulation of adrenergic nerves. Kwiatkowski and I have obtained direct evidence of this in experiments with the perfused ears of rabbits. For these experiments the ear was perfused with the solution known as "Locke-Ringer" by means of a special device which ensured that the rate of flow was practically constant and was not affected by stimulation of the nerves. A sensitive colorimetric test for adrenaline devised in my laboratory by F. H. Shaw (1938) was applied to the outflowing fluid. This test is not affected by ephedrine, and makes it possible to distinguish adrenaline from closely allied sub-

stances. When the nerves were stimulated in the presence of ephedrine an adrenaline-like substance was detected in much higher concentration than had been possible without ephedrine.

These results show that ephedrine protects the substance liberated by the nerves, and support the theory that the sensitization of adrenergic nerves is due to this effect. Since amine oxidase is the only enzyme which has so far been shown to be inhibited by ephedrine they suggest that this enzyme is present near the nerve endings and constitutes the normal mechanism for destroying the chemical transmitter. I think, however, that the main importance of the results is that they have made it possible to obtain the chemical transmitter in higher concentrations than before and to discover something of its properties. It has been suggested, for example, that the substance liberated by adrenergic nerves such as those in a rabbit's ear is not adrenaline, but noradrenaline. By means of a specific modification of the colorimetric test this possibility has been excluded.

Ephedrine and Adrenaline Antagonism

I have said nothing so far about the explanation of the fourth peculiarity of ephedrine—the diminishing effect of successive doses—nor about the action of large doses in antagonizing adrenaline. I believe that these effects are two aspects of the same phenomenon. Schaumann observed both effects when he perfused frogs with Ringer's solution containing adrenaline. Successive doses of ephedrine produced less and less vasoconstriction, and eventually large doses caused vasodilatation. In this preparation the vasoconstrictor action of ephedrine was probably due entirely to inhibition of amine oxidase, since there was no effect in the absence of adrenaline. The inhibitory effect can be explained on the theory that ephedrine combines with the same receptors in the muscle as adrenaline, but produces no effect when so combined. The receptors thus become blocked up so that adrenaline cannot affect them. Similar explanations have been put forward to account for the antagonistic actions of a number of different pairs of drugs. I think that such a theory was first suggested in 1880 by Ringer and Morshead to explain the antagonism of atropine and pilocarpine on the frog's heart. It is similar to the theory of substrate competition, which I have already discussed. Curtis (1929) put forward this theory to account for the action of large doses of ephedrine in antagonizing adrenaline. He could not explain the diminishing effect of successive doses of ephedrine in this way, because he supposed that ephedrine was acting in the same manner as adrenaline, and it would not seem likely that ephedrine could antagonize itself by keeping itself out, so to speak. The most reasonable explanation now seems to be that ephedrine antagonizes itself by keeping out the adrenaline through which it would otherwise have acted.

Uses of Ephedrine

Pharmacology can sometimes point the way to therapeutics, but it is often very difficult to predict what the end of the journey will be like. I believe that the first sample of ephedrine to enter University College Hospital did so in 1925—in my pocket. Little was known at that time about ephedrine except that it produced prolonged stimulation of the sympathetic and was active when given by the mouth. Perhaps it should have been possible to foresee most of the clinical applications, but a knowledge of these has come gradually and rather erratically. I remember thinking that ephedrine might be of value in Addison's disease. Experience showed that it is not.

The oldest clinical use of ephedrine depended on its action on the pupil. If a 6 per cent. solution is dropped in the eye the pupil dilates in about an hour, and stays dilated for five to twenty hours. The pupil still reacts to light and accommodation is not affected. Ephedrine has been employed for ophthalmological diagnosis in preference to atropine or homatropine. It is said not to increase the intra-ocular pressure.

The best-known use of ephedrine is probably in the treatment of asthma. It dilates the bronchi and relieves attacks in much the same way as adrenaline, compared with which it is less often effective; but its action lasts longer, and it can be taken by the mouth. I suspect that many people take too much. An eighth of a grain is often enough. It has been found to relieve whooping-cough. It has also been used with a certain amount of success in other allergic conditions such as hay fever and urticaria. It is used to prevent, or cure, serum sickness. It is having rather a vogue now for local application to the nose, where it produces vasoconstriction and dries up secretions. It is of little or no value in vasomotor shock, but it is employed to counteract the fall of blood pressure due to a spinal anaesthetic. Ephedrine has been used successfully in both the prevention and the cure of the attacks of heart-block known as Stokes-Adams's syndrome. This is an effect which might have been predicted, because an improvement in conduction in the bundle of His is one of the effects of sympathetic stimulation.

Ephedrine has been widely and successfully used to prevent the pathological sleep of narcolepsy, though it is being replaced for this purpose by its more efficient chemical relative known by the name of benzedrine. The fact that benzedrine produced this effect was discovered suddenly and accidentally, but the history of this use of ephedrine is long and complicated. In 1913 Airila tested the action of the series of drugs in waking up rabbits which had been anaesthetized with chloral hydrate. He knew that cocaine had a stimulant action on the central nervous system, and found that it would wake up his anaesthetized rabbits. He also knew that cocaine stimulated some parts of the peripheral sympathetic system, and thought that the two effects might be associated. So he tested other sympathomimetic drugs for their power to wake up rabbits. His theory was wrong, because adrenaline had no action, so that the two effects were not necessarily associated, but ephedrine woke the rabbits up. Later work has shown that ephedrine has complex effects on the central nervous system which are not yet understood. It has been found to awaken animals anaesthetized with avertin, paraldehyde, and evipan. It also restores reflexes and stimulates the respiration, but it seems to have the opposite effect on animals anaesthetized with barbitone or phenobarbitone. Clinically ephedrine has been found to encourage sleep in children and to prevent it in adults. It causes euphoria in some people. The discovery of these facts led to the use of ephedrine in narcolepsy.

The use of ephedrine in myasthenia gravis could not, I think, have been predicted. Its value in this disease was discovered accidentally by Harriett Edgeworth (1930), who was both a scientist and a victim of the disease. She was taking ephedrine for dysmenorrhoea and found it had a very good effect on her myasthenia. This observation was confirmed, but not explained. It has tended to be overshadowed by the marked effect on this disease of physostigmine and its relations. The use of ephedrine in dysmenorrhoea was originally based on the questionable

theory that dysmenorrhoea was due to parasympathetic over-activity. Favourable reports have been published.

Ephedrine is also employed in enuresis. Its effectiveness—if it is indeed effective—might be explained in the same way, but it is more likely that the action is on the central nervous system. Perhaps I should add that, like so many drugs, ephedrine has been recommended as a cure for sea-sickness.

The toxic effects ascribed to overdosage are general nervousness and insomnia and tremor, vomiting and sweating, palpitations, urinary retention, and skin eruptions. When large doses are given to rabbits over a long period they cause enlargement of the heart with pronounced degenerative changes (Rühl, 1929).

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The psychological reactions of thirty "problem" children who received benzedrine sulphate for one week are recorded by C. Bradley (*Amer. J. Psychiat.*, November, 1937, p. 577). In fifteen there was spectacular improvement. Many became much less emotional, without, however, losing interest in their surroundings; they also experienced a sense of well-being. In this group were some children who had previously expressed their irritability in group activities by noisy, aggressive, and dominating behaviour; these became more placid and easy-going under the influence of benzedrine. No significant changes were detected in the blood or body weight, but in six cases the onset of sleep was delayed for the first night or so. Loss of appetite and nausea were shown by a few children only. The behaviour changes reached their maximum during the second and third hours after the administration of the drug, and there was a gradual reversion to the state normal for the particular child during the following six to twelve hours. In all cases the full effects became manifest on the first day of administration, continued daily through the week, and disappeared as soon as the drug was discontinued. The optimum dose was found to be 20 mg. In eight cases gastro-intestinal symptoms were provoked; these eight children were given subsequently daily doses of 10 mg. for a week; two derived no benefit, suggesting that the lowest dose which they could tolerate was therapeutically ineffective. No relationship was established between the children's ages or weights and their reactions to benzedrine. The author advises that this drug should be further tested experimentally before being recommended for the treatment of behaviour-problem children; he suggests that its action might be explained on the lines that it rectifies the impaired control activity which has given rise to disorders of behaviour.

AMENORRHOEA: ITS AETIOLOGY AND TREATMENT*

BY

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The data accruing from the present-day intensive study of sex physiology are at times bewildering and often overwhelming in their complexity. Nevertheless, from the conflicting mass of scientific evidence new facts are emerging which are furthering our knowledge of the processes associated with menstrual and reproductive function, and new therapeutic agents are gradually being added to the armamentarium of the clinician. These new therapeutic agents have been enthusiastically accepted and applied in the treatment of all gynaecological conditions that might be associated with underlying endocrinal disturbances. In some such conditions they are eminently successful—for example, in many post-menopausal disorders—but endocrine therapy has not fulfilled the early promise predicted. Disappointing response to treatment, however, may not be due to faulty or ineffective preparations but rather to their indiscriminate application. Without some knowledge of the therapeutic action of the various sex hormones and their relation to the mechanism of menstrual periodicity therapy must in the main be conjectural. In this paper I am dealing with a study of ninety-seven cases of amenorrhoea, most of which have been investigated as fully as present-day methods permit.

Methods of Investigation

1. *History.*—A full anamnesis is of great importance. Special attention should be directed to the state of previous health and to the occurrence of any unusual circumstances present immediately before or at the time of cessation of menstruation. Frequently a history of change of occupation, domestic worry, grief, or social estrangement is obtained which has an important bearing in regard not only to aetiology but also to prognosis and treatment. Details of previous menstrual rhythm and loss should be elicited. The presence or absence of menstrual molimina may also be important as regards prognosis; their presence is rather more favourable than otherwise. Information should be obtained as to any increase or loss of weight and its association with the onset of the amenorrhoea.

2. *Detailed Examination of the Reproductive Tract.*—Whilst the whole reproductive tract must pass under review, the size of the uterus requires special attention, as in many cases this gives an approximate index of ovarian function. It is important, where possible, to examine the endometrium histologically—first, to exclude tuberculosis, and, secondly, to obtain information regarding ovarian activity.

3. *Radiographs of the Sella Turcica.*—Though pathological changes of the sella are rarely found, we may discover in some cases distortion of the sella pointing to gross pituitary disease. Occasionally amenorrhoea is one of the initial features in pituitary lesions, and it is on account of the cessation of menstruation that the patient may seek medical advice.

4. *Estimation of the Basal Metabolic Rate.*—This is the only available method of forming an approximate estimation of thyroid function. As the function of the

* Lecture delivered (by invitation) at the British Postgraduate Medical School, Hammersmith Hospital, London.

thyroid gland is controlled by a specific hormone of the anterior pituitary some knowledge of its activity may provide an index of pituitary function. However, although a hypophysis is functioning in a normal manner in regard to its thyrotropic secretion, this does not necessarily imply that it is also active in respect of its gonad-stimulating hormone.

5. *Determination of Sugar Tolerance.*—As pancreatic function is controlled by a specific hormone of the anterior pituitary this test may sometimes be of value as an index of pituitary activity. Occasionally, however, amenorrhoea is the only symptom in early cases of diabetes mellitus, and unless the sugar tolerance is determined the condition may be entirely overlooked until it has reached a more positive phase.

6. *Determination of the Hormone Excretion.*—Estimation of the urinary excretion of the gonadotropic and the follicular hormone affords presumptive evidence of anterior pituitary and ovarian function. As these glands are intimately concerned with the control of the menstrual cycle some knowledge of their activity is of the greatest importance.

In the series of cases under review analysis of the total twenty-four-hour output of urine was carried out, according to the technique already described (MacGregor, 1936), at weekly intervals over a period of one month or longer, and, considered in conjunction with other data, this has in many cases been of value in formulating a basis of treatment. Low values for oestrin excretion show that ovarian function is subnormal, and therefore a reactivating therapy in the form of hypophyseal preparations is indicated.

Functional Amenorrhoea

The causes of functional amenorrhoea may be classified broadly into (*a*) psychogenic influences, and (*b*) general hormonal disturbances.

(*a*) PSYCHOGENIC INFLUENCES

The underlying cause of the endocrine dysfunction is not clear. The onset of amenorrhoea, however, so often follows a mental trauma as to suggest that the motive factor may in some cases be psychogenic. Further, the data obtained from an analysis of the hormone excretion suggest that the hypophysis is primarily influenced by a psychological factor operating either via the higher centres or directly through its autonomic nervous control. The effect of the psychogenic disturbance varies in degree, depending on individual susceptibilities, from amenorrhoea of short duration to a more marked constitutional upset. In the initial stages of this investigation the importance of a possible psychological factor was not realized, and accordingly definite figures regarding its incidence are not available. In a proportion amounting to 60 per cent., however, this factor was present. As illustrating the influence of minor upsets such as environmental and occupational changes on the menstrual cycle, the menstrual histories of thirty-eight nurses may be cited. It was found that during the first year of their training 29 per cent. had amenorrhoea varying in duration from one to ten months.

There are thirteen cases in this series in which the outstanding feature was the constitutional disturbance present. They all had in common loss of weight—compared with normal standards for height and age the proportion of those under weight varied from −15 to −37 per cent.—distaste for food, amenorrhoea, and, with two exceptions, uterine hypoplasia (see Table). These features are characteristic of anorexia nervosa. Sheldon (1937) lays "emphasis on physical aspects of anorexia nervosa which suggest that in some cases there is an underlying hypofunction of the anterior pituitary." He says: "In the chain of events which leads to amenorrhoea the pituitary is involved." While this is undoubtedly true, it may be suggested that in all probability there is an underlying psychological cause in these cases and that the pituitary hypofunction is a secondary phenomenon. As, however, many individuals sustain a similar mental shock

Table showing the Investigation Findings in Thirteen Cases of Anorexia Nervosa

Case No.	Age	Duration of Amenorrhoea (years)	Weight	Corrected Percentage Weight	B.M.R.	Blood-sugar Tolerance					Sella Turcica	Utero-cervical Canal	Endometrium	Gonadotropic Hormone	Oestrin
						F. S.	Hours								
							½	1	1½	2					
1	18	3	st. lb. 6 7	% −26	% −18	100	150	140	128	102	Normal	2″	Fibrotic	−	−
16	20	2	5 9½	−28	−28	90	120	150	140	110	„	2″	V. scanty	−	−
20	22	2½	6 7	−31	−21	85	137	106			„	2″	„ „		
21	26	3	7 0	−25	+ 2	104	121	118	99		„	2¾″	Resting	−	+
26	20	4	6 7	−29	+18	88	100	94	90	90		2¼″		+	−
27	15½	1/4	5 13	−25	−27	91	119	100	90	88		2″	V. scanty		−
33	29	4	6 10	−28		94	116	147	99	83		2″	„ „	−	−
46	21	4	5 9½	−37	−21						Normal	2¼″		−	−
54	22	1½	5 11½	−33	−19						„	2″	V. scanty	−	−
55	24	1/2	7 4½	−15	− 1	98	112	100	90		„	2″		−	−
81	23	1/2	7 4	−26	−10						„	2¼″			
85	18	7/12	6 7½												
86	39	1/4	5 7		−19	82	146	189	216	190		2″			

Classification of Material

Investigation carried out on the above lines showed that in twenty out of a total of ninety-seven cases examined the amenorrhoea was due to a recognizable pathology in the pituitary, ovaries, or uterus, and in a few cases was associated with systemic disease. These will be the subject of a later article. In seventy-seven cases, although no obvious pathological condition was observed, laboratory findings disclosed a disturbance of function, particularly of the ductless glands closely concerned with the menstrual process. These cases are therefore described as "functional."

without any resulting sequelae it is presumed that in those patients who display the syndrome of anorexia nervosa there is an inherent psychological maladjustment which cannot withstand mental trauma.

(*b*) GENERAL HORMONAL DISTURBANCES

In approximately 40 per cent. of the cases no history was obtained of an abnormal psychological stimulus preceding the amenorrhoea: in these it has been presumed that a general hormonal imbalance was the cause of the menstrual disorder. The investigation of these patients showed, however, that dysfunction of the pituitary was present. Whether this was a primary or a secondary phenomenon it was impossible to ascertain.

Treatment of Functional Amenorrhoea

After each case had been investigated as outlined the resulting data were studied. Those cases exhibiting deviations from the normal were treated appropriately. For example, where the basal metabolic rate was low, thyroid medication was given; where anaemia was found, iron was administered. Such treatment was not followed by a return of menstruation in any one case. Those who were over weight, excluding diabetics, were put on a strict anti-obesity regime until their weight was within normal limits. With this treatment alone six patients menstruated spontaneously. It is not clear whether the obesity in such cases is due to a temporary slowing of the general metabolic processes consequent on anterior pituitary hypofunction or is directly associated with derangement of the fat-regulating centre in the hypothalamus arising from the same nervous factor as is responsible for the amenorrhoea. Whatever the cause of the obesity or its relation to amenorrhoea, a suitable regime to counteract it meets with a favourable result in some cases. It is a clinical impression that a strict anti-obesity regime is more efficacious in such cases than thyroid therapy.

The treatment of anorexia nervosa is admittedly difficult. Psychotherapy may be beneficial, but the one patient in the series who was treated in this way, although improved in general health, remained amenorrhoeic. In my opinion improvement of the patient's general health should be the first consideration, and as this is difficult to carry out in domiciliary environment a hospital or nursing-home regime is essential. After a satisfactory response has been obtained from treatment along general lines endocrine therapy should be instituted.

Of the thirteen cases of anorexia nervosa one patient has died as a result of her condition. Seven have had an irregular response to treatment in that one or two uterine bleedings have occurred. The following is the history of one of the cases treated.

Case No. 85.—This patient, aged 18, started to menstruate at 13, and her periods were regular 5/28. Her weight at Christmas, 1936, was 9 st. 7 lb. She had influenza in January, 1937, and was operated on during the same month for appendicitis. After operation her weight was 8 st. 13 lb. On return to school she became very worried at not being able to keep pace with her companions. She gradually went off food, and in February, 1937, her periods stopped. She slowly lost weight, and there was a complete loss of appetite and an apparent inability to eat. She also had attacks of biliousness. When seen on July 23, 1937, her weight was down to 6 st. 7½ lb. and her blood pressure was 90/70. On examination no physical defect was found. She was an alert girl, always on the move. Her condition was diagnosed as one of anorexia nervosa, and complete rest in bed in a home was advised. After a few days of this treatment she began to take an interest in food, became relaxed, and generally felt better. After seventeen days of this negative regime her appetite became normal and there was a tendency to increase in weight. It was now considered that more rapid improvement might follow if menstruation could be re-established. In deference to the parents' wishes examination of the reproductive tract was not carried out. It was presumed, however, from the findings obtained in similar cases that there was a certain degree of uterine hypoplasia. On this assumption, and despite the knowledge that the hypofunction of the pituitary might be aggravated, oestradiol benzoate therapy was instituted. She was given a daily injection of 5 mg. of dimenformon for six days, and after a few days a further daily injection of 5 mg. for seven days—that is, a total dosage of 65 mg. of dimenformon. On September 10, ten days after her last injection, a slight show was seen. Thereafter she was given 100 mouse units of antostab (serum gonadotropic hormone) intramuscularly at three-day to four-day intervals for five injections, and after an interval of ten days a further course of five injections, each consisting of 100 M.U. of antostab plus 100 M.U. of physostab (urine gonadotropic hormone) over a period of fifteen days. She had a slight loss on November 10, and a further course of five injections of antostab plus physostab was instituted after bleeding ceased. Uterine bleeding followed on December 8, lasting three days. Her weight had increased to 8 st. on December 9. She is taking her food well and is now anxious to resume her studies.

Endocrine Therapy

(*a*) OVARIAN PREPARATIONS

The role of oestrogenic therapy in the treatment of amenorrhoea is in my opinion a subsidiary one. There are few cases in which it succeeds when given alone. Such therapy is unnecessary if the uterus is of normal size, as this indicates that there is enough hormone in the circulation to stimulate full development of the uterine musculature, but not an adequate amount for endometrial growth. When the uterus is in a hypoplastic condition oestrogenic therapy is called for in order to promote full uterine growth and increased tonicity, so that the organ may be receptive to the stimulation of the normal secretions of the ovaries when these have been reactivated by anterior pituitary preparations. Should it not be possible to measure the uterus after such treatment the production of uterine bleeding, it is suggested, may be taken as a rough index of full development of the uterine musculature. The other indication for oestrogenic therapy is the finding of an excess of gonadotropic hormone excretion. In such cases it may be postulated that sustained overstimulation of the ovaries, resulting primarily from a temporary hyperactivity of the anterior pituitary, may result in a condition of ovarian hypofunction or fatigue. Direct inhibition of the pituitary or inactivation of its secretion as a result of oestrogenic therapy permits the ovary to elaborate its own hormones at a normal concentration. In this way oestrogenic therapy may be curative, in some cases manifesting an excessive excretion of gonadotropic hormone. The importance of urinary hormone analysis prior to treatment is obvious.

Before anterior pituitary preparations were available the oestrogens alone, or combined with corpus luteum hormone, were the form of therapy most favoured. The general scheme of treatment with the oestrogenic hormones was the intramuscular injection of 5 mg. of oestradiol benzoate every three to four days for five injections. If no result was obtained at the end of ten days after the last injection similar courses were repeated, always with ten to fourteen days intervening. Thirty cases were treated by oestrogenic substances. Twelve of these, including a few who had intensive therapy, failed to respond to treatment. Sixteen responded irregularly in that uterine bleeding was provoked as a result of the treatment, but there was no continuation of a cycle on its

cessation. In two cases exhibiting excessive excretion of gonadotropic hormone menstruation became regular, and in one it has continued regularly for twelve months; the other, however, relapsed after three cycles. Analysis of the urine during the relapse showed that the excretion of gonadotropic hormone had again become excessive; after further treatment, however, there have been two periods.

(*b*) ANTERIOR PITUITARY THERAPY

The preparations available for therapeutic use are the anterior pituitary gland products, the anterior-pituitary-like or chorionic hormone prepared from pregnancy urine, and the gonadotropic hormone prepared from the serum of pregnant mares. The rationale of this form of treatment is ovarian stimulation, but it must be emphasized that it is a substitutive therapy. I believe that a temporary or, in some cases, a sustained anterior pituitary hypofunction resulting from a psychological disturbance may so vitiate the general hormonal balance that the disorganization may be perpetuated after a normal psychological status has been established. The stimulation of the ovary by anterior pituitary preparations permits it to elaborate its own hormones, which, in turn, stimulate the uterus. The restoration of normal ovarian activity promotes an adjustment of the general endocrinal imbalance.

Four cases were treated with anterior pituitary gland extract (gonadotraphon). In three there was no response, whilst in the fourth case uterine bleeding has been produced during the past five months; a course of therapy, however, was given each month during that time. Many cases were treated with anterior pituitary extract containing thyrotropic hormone (ambinon) alone or combined with urine gonadotropic hormone (pregnyl), but no continuous response was obtained with this therapy.

The predominant effect produced by the chorionic hormones in the experimental animal is luteinization of follicles. These hormones have been shown to have no effect on the ovaries of monkeys (Johnson, 1935). In amenorrhoea, therefore, where ovarian function is presumably subnormal or in abeyance and the secretion of oestrin is at a minimum, there are no ripening follicles capable of being luteinized. Highly luteinized ovaries, with the elaboration of progesterone, would only rarely bring about a secretory phase in the endometrium owing to the absence of the prior action of oestrin. Support was obtained for this view in that curettage in these cases seldom disclosed an endometrium stimulated to such a degree as to be capable of being changed to a secretory phase. Sixteen cases were treated with chorionic or urine gonadotropic hormone, with very disappointing results. Only two responded satisfactorily.

(*c*) SERUM GONADOTROPIC HORMONE

This hormone is capable of stimulating ovarian growth and function in monkeys (Engle and Hamburger, 1935), and has a gonad-stimulating effect in the hypophysectomized experimental animal. In this respect its biological action is similar to that of the anterior pituitary gland. At the present time, therefore, this preparation seems to be the one which is likely to be most beneficial in cases where ovarian stimulation is required. Engle and Hamburger have shown that it has the same effect on the ovaries of monkeys as the anterior pituitary hormone found in castrate urine. This hormone, believed by many to have a follicle-stimulating action only, has been demonstrated by Frank, Salmon, and Friedman (1935) and Lipschütz (1935) also to produce luteinization, provided a sufficiently high concentration is given. Since there is no conclusive evidence that more than one anterior pituitary sex hormone is secreted, this postulate has been used as the basis for therapy. It is considered that the difference between the hormone present in pregnant serum and that in urine may be due to chemical interactions. In this series of cases, therefore, both hormones have been given together.

The scheme of treatment adopted was as follows: When the uterus was found to be hypoplastic, as indicated by the length of the utero-cervical canal, oestradiol benzoate therapy was administered until the uterus was fully developed. If the uterus was of normal size initially, this preliminary treatment was omitted. Thereafter 100 M.U. of serum gonadotropic hormone and 100 M.U. of urine gonadotropic hormone were given intramuscularly combined as one injection every three to four days for five injections. If no uterine reaction resulted after an interval of ten to fourteen days a further five injections were given as previously, and again after an interval of ten to fourteen days another five injections were given. It is advisable, if there is no response to three courses of injections, to defer further treatment for a period of from two to three months. In a few cases response to the first or second course of therapy was immediately followed by a further course of injections in order to supplement pituitary function and cause full reactivation of the ovaries.

Thirty cases were treated in this way with serum and urine gonadotropic hormones. Of these, ten responded satisfactorily to therapy. In three cases, however, after several months of regular menstruation a period was missed; a further course of serum plus urine gonadotropic hormone was then given, resulting in a return of the normal cycle. Twelve responded irregularly in that one or two periods occurred after treatment. Eight failed to respond after one or more courses of therapy. Included in the irregular responses are a number of cases in which treatment has only recently been instituted, and it is possible that several of these may continue to menstruate normally.

The following is a résumé of the history and treatment of three of the patients in this group treated by serum and urine gonadotropic hormone.

Case No. 80.—This patient, aged 26, had never menstruated. Her basal metabolic rate was +19 per cent. Blood-sugar tolerance: fasting blood sugar, 123 mg. per 100 c.cm.; at half-hourly intervals after 50 grammes of glucose, 180, 140, 125 mg. per 100 c.cm. The utero-cervical canal was 2¼ inches in length. The endometrium was scanty and not sufficient for histological examination. The sella turcica was normal. With regard to analysis for hormones, the twenty-four-hour output of urine was examined for the gonadotropic hormone and oestrin on five consecutive occasions at weekly intervals; and 40 c.cm. of blood were also tested for oestrin on four consecutive occasions at weekly intervals. No oestrin was found in the blood by the methods used. The urine gonadotropic hormone on every occasion was negative. The amount of oestrin excreted in the twenty-four-hour output of urine was: (1) 19–36 M.U.; (2) 10–20 M.U.; (3) less than 11 M.U.; (4) 22–44 M.U.; (5) 22–44 M.U. On account of the increased metabolic rate, treatment with Lugol's iodine was given until the basal metabolic rate was within normal limits. Thereafter hormone preparations were administered over a period of fourteen months in various courses of therapy. The patient was given a total dosage of 16,000 R.U. of pregnyl, 145 gonadotropic units of ambinon, and 126 mg. of dimenformon. As a result, several uterine bleedings occurred at irregular intervals, but there was no continuation of menstruation on cessation of this treatment. The patient was then given two courses of 200 M.U. of serum gonadotropic hormone plus 200 M.U. of urine gonadotropic hormone, combined as one injection at three-day to four-day intervals, ten days

intervening between each course, making up a total of twelve injections. As a result of this therapy the patient had five uterine bleedings at regular monthly intervals. The rhythm was not maintained, however, and a further course of five injections of serum gonadotropic hormone plus urine gonadotropic hormone was given in May, 1937. Since this last course of treatment menstruation has continued regularly at monthly intervals.

Case No. 65.—This patient, a girl aged 17, had never menstruated. Her twin sister menstruated at 14 and has regular periods. On investigation her weight was 7 st. 12 lb. and her height 5 ft. 5 in. Secondary sex characteristics were normal. The basal metabolic rate was −10 per cent. The sella turcica was smaller than normal. Blood-sugar tolerance: fasting sugar, 87 mg. per 100 c.cm.; at half-hourly intervals after 50 grammes of glucose, 180, 150, 120, 89 mg. per 100 c.cm. The external genitals were normal, the cervix healthy, and the uterus in good position; the utero-cervical canal measured 2½ inches by the sound. The endometrium was so scanty as to be insufficient for examination. The urine was examined for hormone content on two occasions. Urine gonadotropic hormone was negative and urine oestrin less than 10 M.U. per twenty-four-hour output. The patient was treated with Collip's maturity factors over a period of two months without effect. In October, 1936, a course of therapy with 200 M.U. of serum gonadotropic hormone combined with 200 M.U. of urine gonadotropic hormone was given at three-day to four-day intervals for five injections. There was no result from this course of treatment, and it was repeated in November, 1936. Ten days after the last injection uterine bleeding occurred for three days; since then menstruation has been regular every twenty-eight days—that is, over a period of thirteen months.

Case No. 35.—This patient, a woman aged 24, first came under observation in August, 1933. Menstruation began at 13 and had been regular (4/28) until January, 1933. Her father died in November, 1932. Before any investigation was carried out the patient was put on progynon by injection and dragees orally, and between August 21 and November 22, 1933, 71,300 M.U. of progynon were injected and 7,800 M.U. given by mouth. Uterine bleeding started on December 3 and lasted five days. A further total course of 50,000 M.U. was then given by injection and 1,650 M.U. by mouth in the form of progynon. A uterine bleeding occurred from January 3 to 4, 1934. Thereafter another course of 40,000 M.U. of progynon oleosum given by injection was followed by uterine bleeding on February 25. She then had, by injection, 80,000 M.U. progynon oleosum and 120,000 M.U. oestroform, without effect. The patient was admitted to hospital for investigation. Her weight was 7 st. 10¾ lb. and her height 5 ft. 4 in. The basal metabolic rate was +7 per cent. The sella turcica was normal, and *x*-ray examination of the chest proved negative. Blood-sugar tolerance: fasting sugar, 100 mg. per 100 c.cm.: at half-hourly intervals after 50 grammes of glucose, 150, 126, 100, 98 mg. per 100 c.cm. Fields of vision were normal. The utero-cervical canal measured 2½ inches; the endometrium was very scanty. The twenty-four-hour output of urine was examined for hormones on five occasions at weekly intervals. No gonadotropic hormone or oestrin was demonstrated in the urine but a positive blood oestrin was once obtained.

Between November 18, 1934, and May 20, 1936, the patient had, divided in various courses of therapy, 95 mg. of dimenformon, 9,100 R.U. of pregnyl, and 90 gonadotropic units of ambinon in conjunction with 1,800 R.U. pregnyl. During that time the patient saw traces of blood on five occasions. The last bleeding was on March 22, 1936. From May 31 to August 23, 1936, she was given two courses of serum gonadotropic hormone along with urine gonadotropic hormone. The total amounts of the two courses were 2,000 M.U. of each preparation. Menstruation started on August 19, the bleeding lasting four days; since then—that is, during sixteen months—it has been regular 4–5/28-day type.

It is not likely that menstruation will proceed spontaneously in every case of amenorrhoea responding to this therapy: cognizance must be taken of the motive factor producing the amenorrhoea. It is, however, probable that menstruation will follow regularly if, by periodic supplementing of the anterior pituitary gonadotropic hormone when it is necessary, the menses can be kept going long enough. It is not improbable that the dosage of the gonadotropic hormones given in this series was inadequate in many cases, but the amounts available at the present time preclude the administration of a much higher dosage.

Spontaneous Onset of Menstruation

It is difficult to assess the results from any one line of treatment in amenorrhoea, as the possibility of the spontaneous onset of menstruation must always be considered. This applies particularly to indiscriminate treatment without prior investigation. Sometimes, from an analysis of the urine for hormone content carried out at weekly intervals, it can be predicted that menstruation is likely to ensue spontaneously.

In eleven out of seventy-seven cases of functional amenorrhoea menstruation recommenced spontaneously. The period of amenorrhoea varied, the longest period of secondary amenorrhoea being five years, whilst one patient with primary amenorrhoea started menstruating at the age of 25. This latter case is of interest in that treatment had been instituted over a period of six months, and during that time, in various courses of therapy, the patient had had a total dosage of 4,600 R.U. of pregnyl, 200 mg. of dimenformon, and 45 mg. of progestin. One of these courses was carried out on the lines indicated by Kaufmann (1934). No uterine bleeding was produced as a result of the treatment. It must be added that marriage was advised when that question arose with this patient, and after eleven months of conjugal life menstruation ensued. This is the only case of primary amenorrhoea in the series which has menstruated spontaneously.

Discussion

The factor or factors responsible for the cessation of menstrual rhythm are rarely apparent. It is therefore necessary that every avenue of approach in the investigation of each case be explored in an attempt to elucidate the underlying cause or causes. An investigation such as suggested reveals in some cases a pathological cause of the amenorrhoea, but in the majority of cases only disturbances of function are found. Further, the investigation is of value in that it often yields presumptive evidence of the degree and nature of the disorder. Rational therapy formulated on this basis is obviously more likely to meet with success than that which is largely empirical.

It has been suggested that the aetiological factor in the majority of cases of functional amenorrhoea is a psychological one; yet in many cases it is undoubtedly not only a suggestion but a true statement of fact. Just as an abnormal psychological stimulus may result in amenorrhoea, so also may a similar factor result in a return of menstruation in an amenorrhoeic patient. This may explain why in some cases menstruation recommences spontaneously after months or years of amenorrhoea.

Although in a few cases of amenorrhoea the oestrogens are of value, in many they are contraindicated, as they may produce a further inhibition of an already underfunctioning hypophysis. The results obtained in the present series, and those of many other investigators, indicate that the chorionic hormones *per se* have, for the reasons already stated, very little place in the treatment of amenorrhoea. Until reliable anterior pituitary gland

preparations are available, when a true substitutive therapy can be carried out, the most hopeful preparation seems to be the serum gonadotropic hormone alone or combined with the urinary gonadotropic hormone.

No differentiation has been made between primary and secondary amenorrhoea, as it has been found that when congenital defects are excluded the findings are comparable in both types, and therefore the treatment is similar. The prognosis is just as favourable in primary as in secondary amenorrhoea.

Summary

1. The investigation required in a case of amenorrhoea is detailed, and some consideration is given to the value of each procedure.

2. The primary and secondary factors responsible for the inhibition of menstruation are discussed.

3. The results of treatment based on the investigation findings are presented.

My thanks are, first of all, due to the members of the honorary gynaecological staff of the Royal Infirmary, Edinburgh, for permission to investigate and treat cases under their care. I also most cordially thank Dr. A. N. Macbeth of Organon Laboratories, Dr. H. Neumann of Schering Ltd., Dr. T. A. Lloyd Davies of Boots Pure Drug Co., and Messrs. Paines and Byrne Ltd. for the generous way in which they have placed their preparations at my disposal. I also express my appreciation and thanks to Glaxo Laboratories for making available to me large amounts of anterior pituitary preparations.

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D. Whyte and R. O'Regan (*N. Zealand med. J.*, December, 1937, p. 381) refer to a previous paper published in February, 1937, in which they stated that the treatment of complete prolapse of the rectum by Gabriel's injection technique was "safe, painless, and effective." They now wish to qualify this statement, as a case has been seen in which the patient's life was in serious danger for some weeks from sloughing of the rectal wall and secondary haemorrhage, although the final result was satisfactory. The patient, a man of 55, was suffering from intractable prolapse of the rectum with continued mucous discharge. Seven submucous injections were given, each of 2 c.cm. of 5 per cent. carbolic acid in almond oil, and three perirectal injections of saline solution. Vomiting and headache persisted for a week, and on the eleventh day after operation a sudden copious haemorrhage from the rectum occurred. Examination under anaesthesia was carried out, and a large sloughing area was found on the posterior wall of the rectum extending into the pararectal tissues, the sacrum being palpable through a mass of blood clot. An acriflavine gauze pack was inserted, and was replaced two days later by a small flavine-vaseline pack. Nineteen days after the original operation a left inguinal colostomy was done. Six blood transfusions had been given during this period, and repacking had been carried out several times on account of bleeding. At the end of two and a half months proctoscopy showed the rectum to be healed and firmly fixed in the sacral hollow, and at the end of a further month the colostomy was closed and the patient made a good recovery.

RATE OF SEDIMENTATION OF RED BLOOD CELLS AS A CLINICAL TEST IN GENERAL PRACTICE

BY

E. SCOTT, B.A., D.M., B.Ch.

This investigation was undertaken two years ago to determine the value of the blood sedimentation rate (B.S.R.) as a test for the general practitioner. From my material I have chosen the experiments which are most likely to be of use. For the test to be practical it must conform to certain conditions. It must be quick, easy of application, and independent of elaborate apparatus. These conditions are satisfied. The blood can be collected and the tube filled in the time it would take to spread a blood film, and the reading, which takes place an hour later, can be jotted down by any educated person. The work has been done in three places—Ashford Hospital, my surgery, and the patient's home. As regards the last-mentioned, to avoid the dangers of transport with a filled tube it is a good plan to leave the tube to be read by the patient at the required time or marked with a strip of stamp paper. Attention to minute differences in end-results is undesirable and may be misleading. The B.S.R. is altered in a variety of pathological conditions that affect the body as a whole. It is thus, within limits, an indication of the existence of organic disease, particularly of an inflammatory nature, and a guide in the assessment of recovery. In theory it runs parallel to the temperature chart, but it covers a wider field, is slower to rise and decline, and can indicate infection in the absence of pyrexia. It affords a closer comparison with the Arneth count. It is the extent and scope of the test which constitute its strength and weakness and render its investigation difficult. The test has become a routine one in hospital practice in many parts of the Continent, particularly Germany, Scandinavia, and Switzerland. It is rapidly becoming popular in England, where it is used as a standard control in the treatment of tuberculosis and chronic rheumatism. Individual readings are not very instructive. I have, in consequence, endeavoured to gain information by choosing cases of known disease and compiling charts with B.S.R. readings as far as possible from inception to cure. In most cases these are correlated with temperature readings.

Technique

There is a somewhat wide choice of tubes, but I have found that Linzemeier's answers all requirements. This tube is marked at the level reached by 1 c.cm. of fluid, and is graduated in millimetres downwards to 24. The reading is particularly easy, and it is noteworthy that if these graduations are extended they divide the c.cm. into 48, so that figure 1 on Linzemeier's tube represents roughly a B.S.R. of 2 per cent. This affords a useful method of comparison with other apparatus. With a hypodermic syringe and needle a solution of 3.8 per cent. sodium citrate is drawn to the 0.2 c.cm. mark and blood is collected from a vein until the 1 c.cm. point is reached. The piston is then withdrawn slightly and the syringe contents are thoroughly mixed by repeated inversion. The citrated blood is injected into the sedimentation tube up to the top mark (1 c.cm.). The tube is placed vertically in a stand and the height of the supernatant clear fluid read off in an hour's time. These tubes are made by Hawksley and Sons, and I have obtained them from

Allen and Hanburys, who also supply the sodium citrate solution in convenient rubber-capped bottles. It is well to run sterile water (not alcohol) through the syringe and needle and to cleanse the tube with sterile water immediately before use. There is usually slight maladjustment to the 1 c.cm. mark owing to the presence of bubbles in the citrated blood, but the margin of error is seldom greater than 1, and is too small to be of clinical importance. The arbitrary limit where the B.S.R. becomes pathological has been suggested by Dr. T. C. Hunt to be at the 10 mark, and I have adopted this as a working criterion of the normal. It must be understood that B.S.R. = 10, like 98.4° F. on the temperature chart, represents a maximum and not an average or ideal.

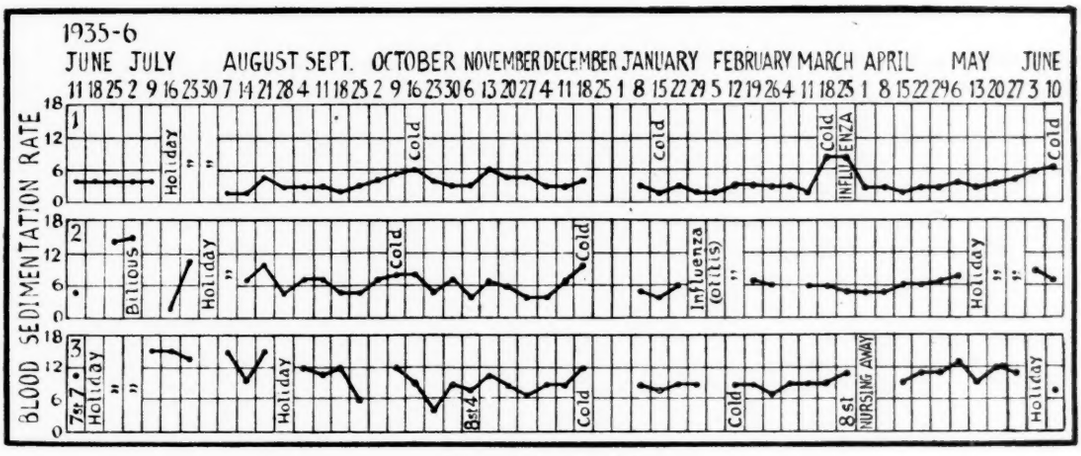

CHART A (1, 2, and 3)

The temperature to which the tube is exposed has been stated to exercise a disturbing factor on the end-result. A few simple experiments have convinced me that this factor can be disregarded in practice. The tubes should be stood in an ordinary room. So long as the direct rays of the sun or the immediate vicinity of a fire are avoided I do not anticipate any difficulty from variations in temperature. Anaemia can of course profoundly affect the result. It is sufficient to say here that small degrees involving a haemoglobin content of not less than 80 per cent. are not of material importance.

The B.S.R. in Normal Health and its Relation to Minor Disturbances

With this particular technique 10 has been generally adopted as the maximum B.S.R. reading in normal health. Making a series of tests in persons apparently in normal health, I found the average reading to be 4 in men and 6 in women. Most observers agree that the B.S.R. tends to be at a higher level in women than in men. Another interesting find is that if the B.S.R. of the same individual is taken at different times a variation of two, three, or even four in the reading is frequently encountered for no obvious cause and corresponding to no obvious deviation from health. In order to investigate this more thoroughly charts were instituted of three individuals—myself (Chart A, No. 1) and two nursing sisters (Chart A, Nos. 2 and 3). Readings were taken at weekly intervals throughout the year and omissions reduced to a minimum. Minor maladies not sufficient to incapacitate, such as colds, are indicated as far as possible.

If we attempt to analyse these three charts separately we note the comparative stability of No. 1: it is probable that, as in most clinical tests of this sort, the B.S.R. tends to be more stable in the male. (Note the rise to 9 on March 18, which is analysed more fully in Chart B.) No. 2 is very unstable at the beginning: a period of malaise followed by the rise to 15 on June 25 culminated in a violent bilious attack—an unexpected occurrence with no apparent explanation. The rises to 9 on October 9 and to 10 on December 18 were the accompaniments of a severe head cold. No. 3 presents many difficulties. The B.S.R. was very high in the early stages. At this time the individual was greatly below weight (7 st. 7 lb.), but this began to go up in the autumn, reaching 8 st. 4 lb. in October and thereafter remaining steady. This was an index of a general improvement in health, which is probably reflected in the lower level and increased stability of the B.S.R., dating from about the middle of September. (Note the disturbance caused by a cold on December 18.)

The consideration of Charts A 1, 2, and 3 leads to the conclusion that each individual has an optimum B.S.R. and that moderate deviations indicate minor maladies. In the case of No. 1 the optimum is 3, that of No. 2 is 6,

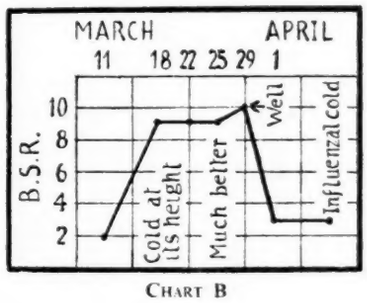

CHART B

and that of No. 3 is 9. Consequently a B.S.R. of 9 in the case of No. 1 would indicate minor illness, whereas the same reading in the case of No. 3 would be compatible with complete well-being. The 10 mark is not in every instance a true maximum of the normal, but it affords a fairly accurate working criterion. Chart B is an analysis of my own B.S.R. during a severe influenza cold in March. Note the fairly rapid rise and the slow decline, the latter lagging after the clinical symptoms had cleared up.

The B.S.R. in Pregnancy

Fahraeus was the first to point out that the B.S.R. is constantly raised during pregnancy, the only physiological condition in which this phenomenon has been observed.

The change, however, does not take place until the later months, and the test is valueless in the diagnosis of pregnancy during the early stages. Chart C was that of a primipara, and began at the tenth week of gestation. For Chart D I am indebted to Dr. J. A. Moore Hall. The B.S.R. readings during pregnancy have been charted, and the matter is pursued to its conclusion where the B.S.R. returns to normal in the fourth week of the puerperium.

B.S.R. in Infections

In the role of the B.S.R. in acute and chronic infection lies its main claim to merit as a clinical guide. It can be discussed under three headings: (1) localized; (2) pulmonary; (3) general. The last two have been, and are still being, the subject of extensive investigations by many workers throughout the world, particularly as regards pulmonary tuberculosis in the one case and rheumatoid arthritis in the other. I accordingly devote myself to the phenomena observed in localized infection.

The characteristic of the B.S.R. curve in the case of an acute infection which ends in recovery is a comparatively steep rise and a slow gradual descent. Though the rise is steep it is slow compared with temperature or pulse-rate variations, which, in the case of fulminating disease, can show extreme disturbance within a few hours. The B.S.R. is unlikely to present much change in the first forty-eight hours, and is hardly likely to reach its peak before the fourth day—often an appreciable time after the maximum pyrexia. This is demonstrated in Charts E, F, and G.

Case 1 (*Chart E*).—In this case, that of a man aged 37, operation was performed for acute appendicitis on November 4, 1934, the second day of the illness, which had supervened on a subacute condition lasting three weeks. The appendix was full of pus. Drainage was not done. After a few days' discomfort the patient made a normal recovery. The B.S.R. was only 6 on the day following the onset of the illness, and on the fourth day reached 18, where it remained for a few days before starting to decline.

Case 2 (*Chart F*).—A healthy man, aged 49, was admitted to hospital for inguinal hernia. Operation was performed and progress was satisfactory until the seventh day, when severe pain was felt in the right side with rise of temperature, apparently from pulmonary congestion or a small infarct. Pain lasted for a few days after the temperature had fallen. Note the slow but steady fall of the sedimentation rate and the (presumably) steep rise. The B.S.R. apparently started at normal. It reached 18 on the third day after the onset of symptoms and its peak (28) on the fourth day, which was two days after the pyrexia had declined and the patient's symptoms had nearly cleared up. Subsequently its fall was uneventful.

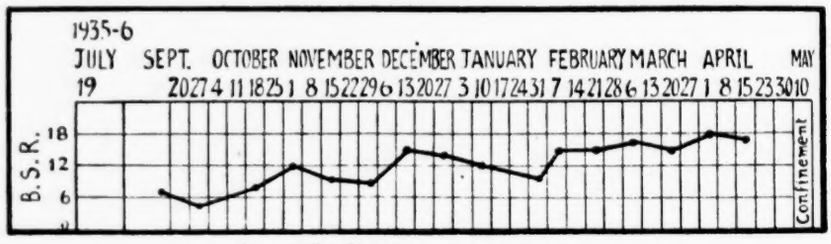

CHART C.—Readings during pregnancy

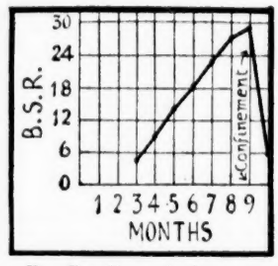

CHART D.—Readings during pregnancy

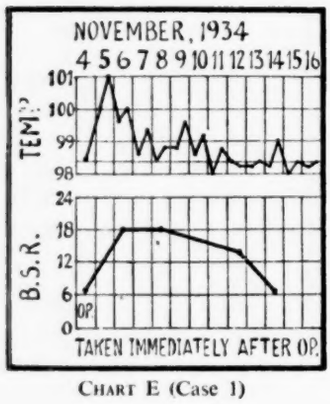

CHART E (Case 1)

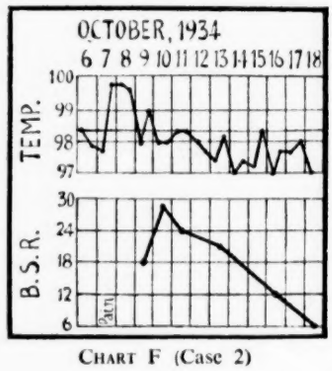

CHART F (Case 2)

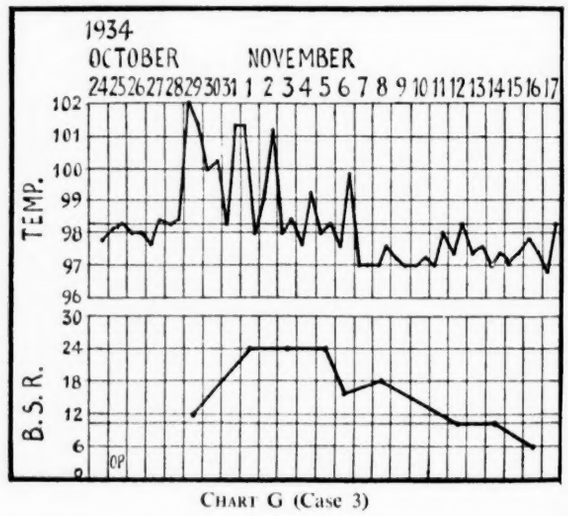

CHART G (Case 3)

Case 3 (*Chart G*).—The patient, a man of 50, was pale, thin, and anxious. Appendicectomy for chronic abdominal pain was performed on October 25, 1934. Recovery was uneventful until October 29, when he complained of acute pain in the left side. The temperature rose steeply, and he developed the physical signs of pleurisy in the left base. Recovery took place and the temperature subsided by November 7, a few days after which he was allowed to get up. Radiographs taken on November 12 revealed a patch, indefinite in outline, at the left base, and a small quantity of pleural fluid. The next day the fluid had disappeared, but the patch was still distinctly visible in the film. The patient was discharged well on November 17. His B.S.R. was 12 on the first day of the pleurisy, when his pyrexia was at its peak at 102° F. The B.S.R. reached 24 three days later and remained there for four days, starting a steady decline four days after the main febrile disturbance had subsided.

This methodical use of the B.S.R. limits its value in the diagnosis of acute disease, and reserves its main field of usefulness for chronic infection. For instance, it is valueless as a guide in acute appendicitis, where operation

should be undertaken in the first twenty-four hours. Fortunately, in these and similar cases enough evidence should be provided by clinical examination.

I will now deal with the decline of the B.S.R. This is always comparatively slow and lags behind the symptoms. It appears to indicate not only the elimination of infection, but actually the completion of the process of repair. In this way it offers a highly reliable criterion of recovery. We may conveniently divide these descents under the headings "satisfactory," "interrupted," and "unsatisfactory." A satisfactory decline in the B.S.R. is simply one that is continuous. It may be either quick or slow, and it is likely that the time it takes is an assessment of the extent rather than the acuteness of the infection, and the amount of cleaning up that the damage to the tissues requires. Complicated and important systems of the body such as the biliary passages need an elaborate process of repair. Charts E, H, and J represent satisfactory descents with various rates of decline.

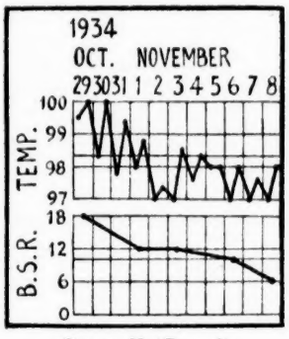

CHART H (Case 4)

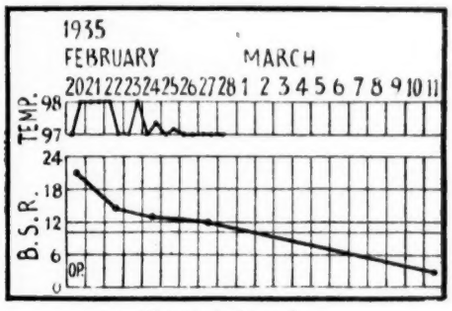

CHART J (Case 5)

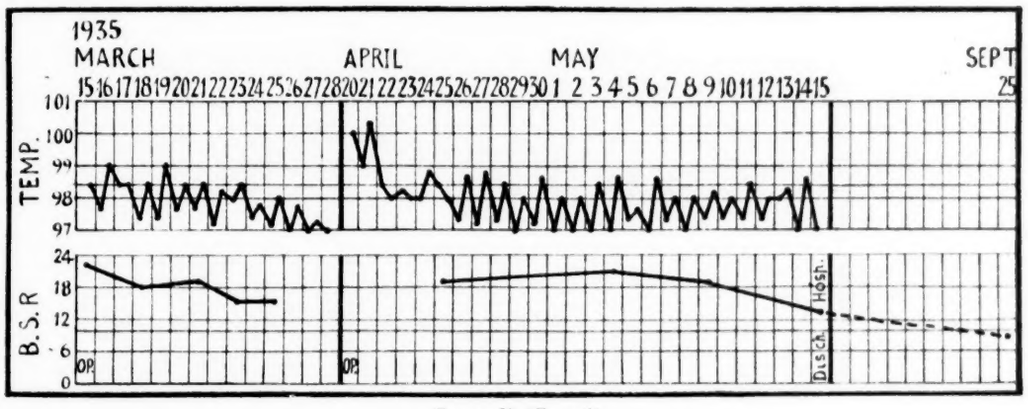

CHART K (Case 6)

An interrupted decline in a B.S.R. chart affords evidence of the occurrence of a complication. Charts F and G are illustrative; Chart G deserves comment. The patient's appearance, the *x*-ray findings, and the symptoms suggested an activated tuberculous patch in the lung. The failure to find tubercle bacilli and, above all, the satisfactory decline of the B.S.R. negatived this assumption. It is well known that the return of the B.S.R. to normal in active pulmonary tuberculosis is slow.

Charts which show an unsatisfactory decline are those in which the return of the B.S.R. to normal does not take place although the clinical symptoms disappear up to a point. They generally indicate the continuance of the original infection and call for active treatment. Chart K is one of these. Note the unsatisfactory fall of the B.S.R. after myringotomy on March 15, and compare with Chart J. Note also the steady decline following the mastoid drainage on April 20 and the final return of the B.S.R. to normal.

Case 4 (*Chart H*).—This patient, a man aged 37, had been in poor health for some weeks and had had his teeth extracted. A week before admission to hospital he sustained a scratch on the knuckle, and the hand and forearm began to swell and become red. When admitted on October 29 the swelling was extensive, with much tenderness and redness. The scratch on the knuckle had become septic, and there was severe lymphangitis. Treatment by fomentations brought about immediate improvement, and on November 4 the swelling had become localized proximally to the knuckle. On November 6 pus was squeezed from this through an exit in the scar. On November 7 there was no pain, swelling, or tenderness.

Case 5 (*Chart J*).—A man aged 59 was admitted with pain in the ear and pronounced mastoid tenderness for about four days. He looked ill; there was no pyrexia, but a slight discharge from the ear occurred one night. Myringotomy was performed. Clear fluid was seen for two or three days only, and the symptoms cleared up. At the time of operation the temperature was 97° F. and the sedimentation rate 21.

Case 6 (*Chart K*).—This patient, a woman aged 70, developed influenza with bronchitis one month before admission to hospital. Improvement was followed by relapse, with ear symptoms consisting of pain, deafness in the right ear, some mastoid tenderness, and slight pyrexia. The ear "grumbled" for two weeks. The patient was admitted to hospital on March 15, 1935, and myringotomy was performed. Drainage was established, but it was not very efficient. The symptoms slowly subsided and she then left hospital. On April 3 she was still very deaf, and there was some mastoid tenderness and slight discharge. In a few days the symptoms began to return, gradually getting worse. Neuralgic pains radiating from the right ear were felt, and there was mastoid tenderness and deafness, with discharge from the tympanum. Eventually it was decided to operate on the mastoid. The patient was readmitted on April 20, and a Schwartze operation was performed. The mastoid was

thoroughly cleared, pus being found. Convalescence was uneventful, and she was discharged on May 15 with the wound and the tympanum healed and hearing nearly restored to normal. Complete recovery ensued, and the patient had no complaints to make when last seen on September 25.

Summary

1. A simple method is described in which Linzemeier's tube is employed.

2. The figure 10 is selected as the usual maximum reading attained in health.

3. A chart method is employed. By taking weekly readings throughout the year it is shown (*a*) that the B.S.R. varies in health within moderately wide limits; (*b*) that each individual has an optimum reading; (*c*) that moderate deviations from this can usually be attributed to minor ailments.

4. During pregnancy the B.S.R. is undisturbed until about the fourth month, when a steady rise takes place till term.

5. General principles are deduced from the behaviour of the B.S.R. in local infection. The rise of the B.S.R. to an appreciable degree takes about three days. Its decline is comparatively slow, and is (*a*) continuous and satisfactory; (*b*) interrupted, due to complications; or (*c*) incomplete and unsatisfactory. Cases should be followed up until the B.S.R. returns to normal.

I owe my thanks to Dr. T. C. Hunt, who first aroused my interest in the subject, and to Professor J. R. Fraser for suggestions and criticism.

Towards the expense of this research a grant was made by the British Medical Association.

ASCORBIC ACID IN BRONCHIAL ASTHMA

REPORT OF A THERAPEUTIC TRIAL ON TWENTY-FIVE CASES

BY

H. B. HUNT, M.D.

There is a certain amount of evidence that ascorbic acid may play a part in allergic conditions in general and asthma in particular which, although suggestive, is difficult to correlate exactly, and is perhaps best classified in three groups as follows:

Theoretical Considerations

1. Hypersensitivity to foreign proteins results after adrenalectomy in dogs (Simpson, 1937). In asthma a condition of protein hypersensitivity also exists, and hypoplasia of the adrenal glands has been noted in asthmatics coming to necropsy (Adam, 1931; Waldbott, 1933–4). An eosinophilia is not uncommon in either asthma or Addison's disease. At least one case has been recorded of the association of these two conditions (Wilkinson, 1937).

2. Adrenaline, the most potent anti-allergic remedy yet known, is a secretion of the adrenal medulla. The fact that cortical extracts have been employed in asthma without any marked success (Cohen and Rudolph, 1934–5; Wilmer and Miller, 1936) tends to show that if the suprarenal glands are affected in this condition, then the medulla rather than the cortex is involved.

3. Ascorbic acid is normally present in the adrenals. Indeed, it was from this source that Szent-Györgyi originally isolated vitamin C.

From these disjointed observations it appears probable that (1) asthma or allergy may be associated with adrenal hypofunction; (2) the medulla is chiefly at fault; (3) some especial relation exists between ascorbic acid and the adrenals. Dr. L. J. Harris has suggested (in a personal communication) that as, in the light of recent observations, one of the functions of ascorbic acid appears to be to prevent the oxidation of adrenaline, it may be possible, by giving suitable doses, to conserve sufficient adrenaline to prevent the occurrence of asthmatic symptoms.

Vitamin C in Anaphylaxis and Allergy

Claims have been made that ascorbic acid will protect guinea-pigs against anaphylaxis (Hochwald, 1935; Salomonica, 1936), and in human beings will diminish the cutaneous reactions to tuberculin, in positive reactors when given intravenously (Heise *et al.*, 1937). Hochwald (1936) has employed ascorbic acid in cases of bronchial asthma, and found it of some value in preventing symptoms when given regularly, or aborting symptoms when injected intravenously in massive doses (500 to 1,500 mg.). Epstein (1936), while unable to confirm the work of Hochwald when he used ascorbic acid in either asthma or hay fever, did find that it was distinctly valuable in the treatment of asthma if employed in conjunction with injections of gold salts.

Investigations

In view of what has been said above there is reason to expect that ascorbic acid may prove useful in the treatment of bronchial asthma. It is not suggested that asthma is a deficiency disease or even that the majority of asthmatics suffer from a subclinical C avitaminosis. Ascorbic acid was given to exert any anti-allergic properties which it may possess rather than to correct a specific deficiency. As all of the cases were out-patients it was not practicable to employ the usual laboratory procedure of estimating any possible avitaminosis. However, among the whole of the patients attending the asthma clinic of the Birmingham General Hospital during the last year I detected only one who showed any clinical signs of vitamin C deficiency. In this case the symptoms—bleeding of the gums and lassitude—were very mild, and cleared up after suitable treatment with ascorbic acid.

Clinical Material.—Twenty-five patients were investigated—sixteen females and nine males; five of them were children. Other allergic symptoms were present in seventeen cases, and chronic bronchitis in nine. Thus, although small, the series was fairly representative.

Dosage and Method of Administration

The ascorbic acid was dispensed in tablets of 50 mg. (the synthetic preparation of Roche Products Ltd., redoxon, was employed throughout), two of these being given for each day, one to be taken in the morning and one at night. Each patient received one or two weeks' supply of tablets when attending the clinic. The course was designed to last for eight consecutive weeks, but as attendances were not as regular as could be desired all the patients did not complete eight weeks' treatment, and, of those who did, not every one covered the course in eight consecutive weeks. During this treatment no medicine or injections such as vaccines were given, apart from antispasmodics—for example, ephedrine or "felsol" powders—or medicine for a troublesome cough. Five patients (quite apart from the group of twenty-five mentioned above) seen when symptoms were present were

given massive doses of ascorbic acid by injection. One of them received 500 mg. intramuscularly, another 800 mg. intravenously, and the remaining three 500 mg. by the same route.

Results

In reviewing the twenty-five cases after several weeks' treatment by oral medication with 100 mg. of ascorbic acid daily no evidence could be found of any marked improvement in the amount of wheezing, the incidence of attacks, or the general condition. None of the five patients who received injections of ascorbic acid in doses of 500 mg. or over experienced any relief in their symptoms after a period of twenty to thirty minutes, and the amount of adrenaline subsequently required to relieve the spasm was in no way diminished. Thus it was impossible to confirm the statement of Hochwald (1936) that asthmatic symptoms could be relieved by large intravenous injections of ascorbic acid. It may be mentioned that in these five cases symptoms were severe in two instances and slighter in three.

Conclusions

The investigations described above have not shown ascorbic acid to be of any value in the treatment of bronchial asthma when given in comparatively large doses either by injection or by mouth.

I wish to thank Professor W. H. Wynn for the facilities he offered me in the investigation; and also Roche Products Ltd. for the supplies of redoxon which they kindly placed at my disposal.

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R. Benda (*Prag. med. Z.*, January 25, 1938, p. 67) does not agree that a retroverted uterus discovered during a routine examination and producing no symptoms should be left untreated. He recommends replacement and insertion of a pessary in all cases. Operative treatment is indicated if after one year's conservative treatment the uterus still becomes displaced after removal of the pessary. Replacement of a gravid retroflexed uterus should only be undertaken in hospital. Although spontaneous replacement may take place, and although it may be aided by lying in the prone position, it must not be left to chance. When retroversion is due to pelvic peritonitis conservative treatment of the pelvic inflammation is indicated. The insertion of a ring pessary in the treatment of uterine prolapse is only of value when the levatores ani are still intact. It is valueless when the neck of the cervix is elongated and when cystocele or rectocele is present. Of the various operative procedures Benda advises Wertheim-Schauta's method of interposition of the uterus between the vagina and bladder, or Halban's fixation of the uterus to the bladder. He attacks anterior and posterior colporrhaphy as an operation attended by an appalling proportion of relapses. Measures for the prevention of uterine prolapse include careful forceps deliveries, more frequent use of episiotomies, and exercises in the puerperium. Benda advocates that women should be encouraged to get up five days after a normal confinement, but they should not be allowed to do their ordinary work for some time afterwards.

THE FEMALE CLIMACTERIC AND THE MENOPAUSE

BY

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The recent advances made in the physiology of the sex hormones have tended to stimulate rather than to satisfy our curiosity. The shafts of light that have been shed on a few isolated points have by contrast served merely to accentuate the darkness of surrounding ignorance. This is particularly true of the existing knowledge of the female climacteric. The common employment of the terms "menopause" and "climacteric" as though they were synonymous advertises the looseness of present conceptions, for although both these conditions possess certain similar features there is no possible justification for regarding them as identical. Some of this confusion may be due to the tendency to make deductions from the similarity of the symptoms of the artificial and of the physiological menopause. Such argument by analogy is always risky (as in the case of the experimental diabetes of pancreatectomy and its supposed clinical counterpart), and in view of the unknown causation of the physiological menopause any inferences should be drawn with extreme caution. Since a clear differentiation between the menopause and the climacteric is becoming increasingly important, the two subjects are here reviewed from both the theoretical and the clinical standpoint.

The Menopause

The use of the term "menopause" should be restricted to its literal meaning of the cessation of the menses, which should also imply the termination of the menstrual life. The cause of this permanent amenorrhoea is not known, but it is commonly accompanied by two principal endocrine changes. First, there is a relative diminution in circulating oestrogens, which are almost or completely absent from the blood stream three years after the cessation of the menses in probably at least 50 per cent. of women. It is doubtful, however, if the menopause is due directly or solely to a decline in the ovarian secretion, since full endometrial hyperplasia, which may be regarded as a specific oestrogenic function, may persist for many years after the establishment of amenorrhoea. Its occurrence has been variously reported in forty out of 804 and fifteen out of 130 post-menopausal subjects (Novak and Yui, 1936). The site of formation of these oestrogens is not known, but some at least may originate in the ovary. In the second place, there is an increased content of prolan A in both the pituitary gland and the urine, but the significance of even this finding is not appreciated. The increased content of prolan in the pituitary is probably more characteristic of a resting than an actively secreting state, and it may be of interest to quote the work of Engelhart and Häusler (1936–7), who reactivated the senile ovaries of rats by the implantation of pituitary tissue.

The Climacteric

The term "climacteric" is derived from the Greek, meaning "a rung of a ladder," and originally was used to describe certain critical epochs, in the life of both men and women, at which the body was believed to undergo radical changes. These epochs were supposed to recur at intervals of nine years, the two important ones being at adolescence and at the sixty-third year, the

latter being referred to as the "grand climacteric." The term may therefore be used to signify certain changes in function, and to a less extent in structure, which take place at or after middle age. These changes lack any uniformity and show great variation in severity. The most distinctive mental changes are a progressive introversion of the mind, with depression, inertia, and insomnia, while the normal physiology of the body is subject to innumerable disturbances, the majority of which are characterized by transient or persistent sympathetic discharge (Donald, 1937): common among these latter symptoms are headache, dizziness, various rheumatic affections, and swelling of the extremities or face.

In the past no investigator has drawn any practical distinction between the menopause and the climacteric, and hence no attempt has been made to establish any endocrine relation or difference between these two conditions. From the clinical view-point there can be but little doubt that involutionary changes affect glands other than the ovaries. A mild degree of myxoedema is considerably more common than states of true hyperthyroidism, the occasional occurrence of which may perhaps be due to the trophic influence on the thyroid gland of a hypertonic sympathetic nervous system. Similarly, the majority of cases of diabetes mellitus which originate at the climacteric would appear to be due to a depression of insular activity, and only a small percentage of cases may be attributed mainly to excessive glycolysis from sympathetic discharge. I have seen several cases the symptoms of which bore a striking resemblance to Addison's disease, even to the characteristic pigmentation and fall in blood chlorides. It would therefore seem likely that these multiple glandular disturbances may possess some common origin, which for reasons previously mentioned may well be a reduced secretion of the anterior pituitary.

It will thus be seen that the climacteric differs from the menopause in being a general rather than a local disturbance, and in being a chronic immeasurable clinical state rather than a clear-cut observable symptom.

Relation between Menopause and Climacteric

In the past it has been assumed that the menopause initiated the climacteric and that the two conditions were clinically inseparable. This conception is open to considerable criticism and doubt. Since the principal symptoms of the climacteric are to a large extent non-specific in nature and essentially nervous in origin, their time of onset, severity, and chronicity may be regarded as the resultant of at least two intrinsic forces: (1) the fundamental constitution of the individual, in which I include the basic endocrine pattern and its consequent influence upon the tone and equilibrium of the autonomic nervous system; and (2) the individual degree of endocrine change which occurs at the climacteric. In general the more unstable a nervous system is, the smaller are the degrees of endocrine change which are capable of disturbing it. Now since this constitutional factor varies so widely in different individuals, considerable variation in the onset and severity of climacteric symptoms might be expected, even supposing that the rate and degree of endocrine involution were constant. In point of fact, however, much evidence has recently accumulated to suggest that these endocrine changes also are subject to great individual variation.

Although in many women oestrogenic substances are absent from the blood and urine three years after the menopause, in many others this reduction is extremely gradual, for these substances have been found to persist in considerable quantity in both the circulation and the urine for twenty years or more after the menopause (Robson *et al.*, 1934; Frank, 1934; Frank, Goldberger, and Spielman, 1934; Frank, Goldberger, and Salmon, 1936). A further indication of this persistent oestrogenic secretion may possibly be given by some observations which I have made on the amounts of oestrone and oestradiol that are effective in producing proliferative bleeding in the post-menopausal subject. The work of Kaufmann and others has demonstrated that approximately 25 mgm. of dihydroxyoestrin injected intramuscularly are required to produce proliferation of the endometrium in the castrated subject. In the treatment of the climacteric by oestrogenic compounds, however, ten out of 120 patients have reported the occurrence of uterine haemorrhage after very much smaller amounts. Details of these cases are summarized in the accompanying table:

Case No.	Age	Years past Menopause	Duration of Treatment in Weeks Prior to Haemorrhage	Weekly Replacement of Oestrin in Mg.	Total Replacement in Mg.
1	69	18	13	1 B; 2 O	13 B; 26 O
2	63	17	5	6.3 O	31.5 O
3	63	11	4	1 B; 2 O	4 B; 8 O
4	58	18	4	2 B; 2 O	8 B; 8 O
5	57	10	6	2 B; 2 O	12 B; 12 O
6	56	5	9	2 B; 2 O	18 B; 18 O
7	54	4	24	1 B; 2 O	24 B; 48 O
8	50	2	20	2 B; 2 O	40 B; 40 O
9	50	1	6	2 B; 2 O	12 B; 12 O
10	48	1	5	2 B; 2 O	10 B; 10 O

B = Dihydroxyoestrin benzoate, given intramuscularly. O = Oestrone, given by mouth.

Cases 3, 6, and 7 were curetted and typical endometrial proliferation was found. Case 2 had a recurrence of haemorrhage after six weeks of further treatment by 0.6 mg. oestrone daily by mouth.

The figures show that there is a marked difference in response between the castrate and the post-menopausal subject.* From these considerations two conclusions may justifiably be drawn:

1. The severity of climacteric symptoms need not be in proportion to the degree of endocrine change. This has already been pointed out by Salmon and Frank (1936), who found that such symptoms could not be correlated either with the amount of circulating oestrogens or with urinary prolan, and yet these symptoms could be relieved by the adequate administration of oestrin.

2. Great individual variation may be expected not only in the severity and chronicity of the climacteric but also, and more particularly, in its time of onset.

From the theoretical side alone, therefore, there is reason to suspect that the menopause and the climacteric may not always possess a close temporal relation.

Practical Considerations

How are these theoretical considerations borne out in practice? In probably 80 to 90 per cent. of women the menopause is closely related to the onset of climacteric symptoms. These symptoms usually coincide with the cessation of the menses, but may precede or follow the establishment of amenorrhoea by a few years. While this close association of the menopause to the climacteric

* One apparently indisputable case of uterine bleeding in a castrate following the administration of only 2 mg. of dihydroxyoestrin has, however, been reported. (Werner, A. A., *et al.*, *J. Amer. med. Ass.*, 1937, **109**, 1027.)

is usual it is by no means invariable. The following case-histories are typical of many others in my possession:

ILLUSTRATIVE CASES

Case 1.—Mrs. C., aged 65. This patient cannot remember exactly what her age was at the menopause—probably about 48. "Had far too much to do to be bothered about that sort of thing." She put on a little weight at that time, but had no flushes or any other symptoms. She experienced good health until two years ago, when she became more easily fatigued, and subsequently developed giddiness with falling, so that she was afraid to go out of doors by herself. She also had insomnia, depression, and slight puffiness of the ankles. Blood pressure 175/115. The patient was referred for special advice on account of her rapidly failing vision, associated with pallor of both optic disks. The subjective symptoms cleared rapidly with 0.1 mg. oestrone thrice daily by mouth, with six injections of 1 mg. oestradiol, given twice weekly at the commencement of treatment. Six months later, with correction, she was reading 6/6 J1 in both eyes.

Case 2.—Mrs. W., aged 68, thinks the menopause must have occurred near the age of 46, "since her little girl was about 2 years old at that time." She may have experienced occasional flushes about then, but was not inconvenienced in any way. She always enjoyed good health until five years ago, when she had an attack of sciatica. Shortly afterwards, symptoms of rheumatism began in the fingers, and for the last three years she had suffered from recurrent neuritis of the arm, pain and stiffness in the knees, insomnia, listlessness, and mental depression. The rheumatism, on account of which she first presented herself, had previously been treated unsuccessfully with gold and physiotherapy. She failed to show any decisive improvement from small desensitizing doses of vaccine, and was accordingly placed upon 0.1 mg. oestrone, three times daily by mouth. In three months she was able to kneel and rise without pain, and her fingers, though much deformed, were also painless. The patient protests against any suggestion that treatment should be discontinued, since with it she feels so much stronger, more energetic, and more cheerful.

Case 3.—Mrs. L., aged 70. She does not remember the date of the menopause, but thinks it must have been about the age of 50. She cannot recollect any symptoms at that time. Her health was excellent until three years ago, when "her age began to tell on her heart." She suffered from palpitations, shortness of breath on exertion, oedema of the ankles and to a lesser extent of the wrists, insomnia, and mental depression. There was also some pain and stiffness in both knees. The heart was found to be much enlarged, and the first heart sound was of poor quality. The blood pressure was 165/120. She was given 0.1 mg. oestrone thrice daily by mouth, with 1 mg. oestradiol intramuscularly twice weekly, and within six weeks she had lost all subjective symptoms. The oedema had disappeared, and her usual optimism and ability to sleep had returned. She has continued to improve during the last six months.

Case 4.—Mrs. R., aged 70. The menopause occurred at about the age of 50. She suffered from occasional flushes at that time, and has had peri-articular rheumatism of the knees with muscular rheumatism for the last six years, with dizziness, headaches, insomnia, and depression for two years. The subjective symptoms were rapidly controlled with 0.1 mg. oestrone thrice daily by mouth and 1 mg. oestradiol intramuscularly once a week.

It will thus be seen that while the menopause was undoubtedly accompanied in these cases by occasional mild phenomena such as hot flushes or some gain in weight, the onset of that wide assortment of nervous symptoms which characterizes the climacteric was delayed for fifteen years or more.

Conclusions

Both on theoretical and on clinical grounds, therefore, it is important to differentiate between the climacteric and the menopause. The former, unlike the latter, is not an epoch but an era: it represents not a simple change but rather the summation of innumerable independent factors; it is a chronic state of potential nervous disharmony which need of necessity bear no relation to the menopause, but which may mature or be activated many years later. Ten years ago these considerations might have been thought of academic interest. To-day, however, they possess a practical significance which it is difficult to overstress.

Good health depends upon normal function. The importance of abnormal function in the production of morbid symptoms and morbid structural change is great, and is by no means fully appreciated. The function of the body is the expression of its physical constitution, of which the neuro-endocrine pattern forms the backbone. Just as the constitution is modified in the first third of life by the endocrine changes of adolescence, so the functions of the body are modified in the last third of life by the changes of the climacteric. These functional changes are responsible in later years for the facilitation of many diseases and the causation of much ill-health. It is true that the exact nature of these changes defies analysis and will continue to do so for many years to come, but the means for the relief of much suffering is already to hand. *X* rays, gonadotropic preparations, insulin, thyroid, testosterone, luteal hormone, and oestrin all have their place in the treatment of these conditions. The employment of these remedies will vary according to the requirements of the individual cases, and in the absence of any measurable indicators is largely a matter of detailed clinical analysis and not a little experience. While financial considerations may limit the use of certain of these preparations, such restrictions seldom apply to oestrin. In those cases where the symptoms of the natural climacteric may be attributed mainly to lack of this hormone, its replacement can, when necessary, be effected entirely by injection and be administered by the patient, relatives, or district nurse. There are very few cases whose requirements exceed 1 mg. of oestradiol two or three times a week, while the majority may be kept comfortable on less. Such treatment cannot be considered as a luxury any more than can the treatment of the diabetic by insulin. It is wrong to regard the functional disturbances of the climacteric as innocuous or unavoidable, and therefore to be tolerated. Rather must they be looked upon as a warning of potential organic change which, if disregarded, may ultimately lead to permanent degeneration of all tissues, particularly the heart and kidneys.

I have endeavoured to emphasize this distinction between the climacteric and the menopause in order to counteract the common impression that indications for endocrine, and particularly oestrin, therapy are limited to a short period which follows the cessation of the menses. The delayed or late climacteric is by no means uncommon, and much suffering can be spared by a wider appreciation of the virtues of oestrin in its treatment.

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Clinical Memoranda

A Successful Femoral Artery Embolectomy

Successful cases of arterial embolectomy are still rare enough to justify the publication of the following notes.

CASE RECORD

A woman aged 39 was suddenly seized with severe pain in the right knee at 10 p.m. on November 12, 1937. At 10.30 p.m. she was seen by Dr. R. D. Miller, who, at 1 a.m. the next day, sent her into the Hull Royal Infirmary with a diagnosis of embolus in the arteries of the right leg. The patient was known to be suffering from auricular fibrillation associated with mitral stenosis of rheumatic origin, and about eighteen months previously she had had a "stroke," resulting in a left-sided hemiplegia. This was presumed to be due to a cerebral embolus.

On admission the patient presented the classical triad of pain, pallor, and paralysis, with some loss of sensation and absent pulsation of the distal arteries of the right leg. The pain was so agonizing that she cried for relief. The pallor was very marked from the knee downwards and less so in the thigh. The paralysis was incomplete, and this also applied to the loss of sensation. There was strong pulsation in the right common femoral artery, but nowhere else in that leg. It was obvious that the arterial circulation of the right leg had been suddenly and completely occluded by a clot, but there was some uncertainty about the exact position of the latter. The concentration of the pain at the right knee, however, and the well-marked pulsation of the common femoral artery just below Poupart's ligament suggested that the termination of the popliteal artery was the most likely site of obstruction.

Operation.—This was begun at 1.15 a.m. (about three and a quarter hours after the onset of symptoms) under spinal anaesthesia. That method was employed in preference to the usually advocated local anaesthesia owing to the fact that some sensation was present in the leg and that the site of the embolus was in doubt. The popliteal artery was first exposed and was found to be collapsed and pulseless; so this wound, which was quite avascular, was left open and the common femoral artery exposed in Scarpa's triangle. There was a little bleeding in this incision, but less than normal. The common femoral artery was found to be distended and to be pulsating vigorously as far as the bifurcation into its terminal branches, which were collapsed. Just above the collapsed area the outline of the embolus could be seen and felt. The common, superficial, and deep femoral arteries were carefully mobilized, and thin rubber bands were passed behind them to act as tourniquets. Throughout the operation the wound and the instruments were kept soaked in a 2 per cent. solution of sodium citrate. A longitudinal incision 1 cm. in length was then made in the common femoral artery just proximal to the embolus, which was carefully removed with fenestrated forceps. The clot was found to be in two pieces, which were blocking the superficial and deep femoral arteries. The upper tourniquet was now momentarily released, whereupon a huge spurt of blood showed the proximal circulation to be free. The incision in the artery was then sutured with a continuous row of through-and-through stitches, the suture material being fine vaselined silk. Release of the tourniquets showed haemostasis to be complete. The first incision was now examined and was found to be bleeding, while the popliteal artery was pulsating strongly, so haemostasis was obtained and both wounds were closed. The foot and leg had by this time become pink and warm. In closing the upper incision a stout piece of silk was passed under the common femoral artery at its upper end and brought out of the wound. This was to be used in the event of a secondary haemorrhage, which fortunately did not materialize.

Convalescence was uninterrupted. On the first and second days following operation the pulsation of the popliteal artery was easily palpable, and although subsequently the impulse was felt only with difficulty, the leg itself remained warm and pink, suggesting that the artery had remained patent.

DISCUSSION

Most of the statistics dealing with arterial embolectomy are taken from a series of 382 Swedish cases published by Einar Key, and these show that the termination of the common femoral artery is the most frequent site for embolic obstruction, accounting for some 54.5 per cent. of all cases.

The prognosis as a rule is bad, and in any one individual case is dependent on the following factors:

1. *Time.*—Cases operated on within six hours have a fair chance of recovery, but after six hours the mortality rate of the limb and the patient rises rapidly. A successful case has, however, been reported in which the operation was done sixteen hours after the onset of symptoms.

2. *General Condition of the Patients.*—These patients are often suffering from carditis with decompensated valvular lesions, and therefore make poor subjects for operation.

3. *Site of Embolus.*—The best results have been obtained in the axillary and brachial arteries, with a 44 per cent. operation success. The femoral and popliteal arteries come next with a 20 per cent. chance of recovery.

4. *Condition of the Artery.*—Previous arteriosclerosis and rough handling of the vessel during operation are both apt to result in post-operative thrombosis of the affected artery. This is far more serious than ligature of the same vessel, since thrombosis tends to spread up and down the artery, thus interfering with the collateral circulation as well as the main stream.

Only about a dozen successful cases of arterial embolectomy have been reported in this country, and although a much larger number must undoubtedly have been carried out we are still behind the Scandinavian countries in this branch of surgery. The remedy is simple: early diagnosis and immediate operation.

I am indebted to Mr. J. N. Young and Dr. R. D. Miller for permission to publish these notes.

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At the March meeting of the Central Midwives Board for England and Wales the following were appointed regular examiners at the London Centre: A. C. H. Bell, M.B., F.R.C.S., J. D. S. Flew, M.D., Dame Louise McIlroy, M.D., J. V. O'Sullivan, M.D., F.R.C.S., N. L. White, M.D., F.R.C.S. Approval was granted to the Central Middlesex County Hospital and Westcotes Municipal Maternity Home, Leicester, for the purpose of providing instruction in the essentials of obstetric analgesia and in the use of a recognized apparatus.

Reviews

METHODS IN CLINICAL PATHOLOGY

Approved Laboratory Technic. By John A. Kolmer, M.D., D.P.H., Sc.D., LL.D., L.H.D., F.A.C.P., and Frederick Boerner, V.M.D. Second edition. (Pp. 893; 380 figures, 12 plates. 30s. net.) New York and London: D. Appleton-Century Company. 1938.

Variations in laboratory technique, even in simpler routine work, are endless, and even the most enterprising and enlightened clinical pathologist has something to learn from others if he but knew it. Among the better bench books designed to spread the most useful information of this kind is Kolmer and Boerner's *Approved Laboratory Technic*, which now appears in its second edition. This work was originally prepared under the auspices of the American Society of Clinical Pathologists, and in its present form it has the sanction of twenty-eight named collaborators as well as in many cases of the originators of the methods described. It covers the whole range of laboratory investigation in relation to medicine, including not only haematology, bacteriology, morbid histology, and chemical pathology, but toxicology and less readily classifiable methods such as tests for pregnancy, while there are useful chapters on general laboratory management, including the cleaning of glassware, the use of the microscope, and the handling of animals. Adequate emphasis is laid on the need for collecting specimens by proper methods, and these methods are fully described. Serology has a full share of attention, and added space has been devoted in this edition to mycology and parasitology.

Individual preferences are such that no one is likely to agree with each and every statement in this book, but most of the procedures described are doubtless the best of their kind. A few methods of doubtful value are included, such as Rivalta's test for serosamucin; alternative tests are sometimes given with no indication of which is considered the better; the lists of bacteria which may be grown from different materials are not very helpful and frequently include non-pathogenic species, and no mention is made of the desirability in interpreting agglutination tests of knowing the degree of agglutinability of the bacterial suspension used. With few exceptions such as these we find nothing to criticize, and it can be said without hesitation that this work is a valuable practical guide. Its usefulness is increased by profuse and apposite illustrations.

EXPERIMENTAL SURGERY

Textbook of Experimental Surgery. By J. Markowitz, M.B.Tor., Ph.D., M.S. in Exp. Surg. Minn. (Pp. 528; 330 figures. 31s. 6d.) London: Baillière, Tindall and Cox. 1938.

A textbook of experimental surgery fulfils a great need in laboratories where animal experiments are carried out. To obtain the details of various technical procedures requires much searching of the literature, often only to find that important parts of the operation are described scantily or dismissed in a few lines. Dr. Markowitz has attempted to fill the gap, and for what he has done laboratory workers in the English-speaking countries will be grateful. Unfortunately the book suffers from the injection at intervals of such sentences as: "The scientific equivalent of worshipping Mammon is to worship an engine," and "Reader, as de Quincey might have asked in his curiously overwrought but beautiful way, What is a plethysmograph? You who do not pretend to cumbersome erudition and who have enough to do to keep up with the facts of surgery without branching into the technic of physiology, be not ashamed (as de Quincey might again have said) if you do not know."

Details of "all the usual instruments necessary for experimental surgery" are given, but Dr. Markowitz omits scissors. Why? Brodie's table is recommended as the most useful, but the figure illustrating this bears little resemblance to Brodie's original design. Suturing is considered, but it is confusing to read on one page that "a continuous suture . . . is therefore better for closing an incision than a lock stitch," and, four pages later, "we do not recommend a continuous (Glover's) stitch," both sentences referring to the closure of an incision. In the chapter on thoracic surgery it is stated that empyema is the usual complication of thoracotomy in the dog. This is not the experience of at least one laboratory in this country, where in a series of over 100 thoracotomized dogs this complication never arose. The modern method of pressure anaesthesia for thoracotomies is not mentioned in the text. Various operations which are carried out inside the chest cavity, such as vagotomy below the lung root and splanchnectomy, are not described, nor is any reference made to experimental work in this country on the oesophagus. O'Shaughnessy's experimental studies on cardiac surgery are not mentioned.

In spite of its many defects this book will prove useful in laboratories where animal experiments are conducted, but it must be realized that while it gives in detail the experience and practice of one large laboratory of experimental surgery, the experimental procedures recommended and described are not the only good ones in existence, nor can the practice of other laboratories in this country be ignored. This book should be a stimulus to British experimenters to compile a textbook which will cover the whole field and include experimental procedures on animals other than the dog.

FORM-GIVING GYMNASTICS

A Text-Book of Gymnastics (Form-giving Exercises). By K. A. Knudsen. Translated by F. Braae Hansen. (Pp. 364; 216 figures. 12s. 6d.) London: J. and A. Churchill, Ltd. 1937.

The widespread publicity given to the Government's physical fitness campaign has stimulated interest in physical education to an extent never before experienced, and it behoves those concerned with the public health to understand fully what measures are desirable and what it is possible to achieve. An astonishing amount of vagueness exists concerning physical education, and in many minds the mention of it wakes only a blurred image of excessively active arms and legs against a background of widely opened windows in the zero hours of a cold morning. To blot out this depressing image and replace it by a positive conception of the aims and possibilities of a constructive system of gymnastics, medical practitioners and students can be strongly advised to read Knudsen's *Text-Book of Gymnastics*. Among the many that have been published recently this book is outstanding as one which combines an idealistic outlook with an intensely practical and rational scheme of work. We expect a high standard in Danish books on educational subjects, and this one, written by the former chief inspector of physical education in Denmark, maintains the record of achievement.

The book deals particularly with form-giving gymnastics based on the Ling system, and consequently its special aim is to mould and develop the body harmoniously, the spine, and the joints and muscles concerned in its move-

ments, being of primary importance. This method is in opposition to the various gymnastic systems which tend to overdevelop single groups of limb muscles (for instance, the much-displayed biceps) and neglect the trunk and body as a whole. The exercises described are exacting for the teacher because they are apparently simple and not spectacular: much keenness is needed to convince the class that their true aim is to prevent deformity by controlling bodily development and to correct incipient deformity. The chapter on the back, which precedes those on the form-giving exercises, is a valuable one and will be appreciated especially by those who have to examine numbers of school children. There are sections on "order exercises" and on game-like exercises suitable for children, but among these it is surely unnecessary and undesirable to describe one as "lunging to war." The photographs illustrating the exercises are good though rather small, and the anatomical diagrams and radiographs of the body in various positions are a welcome feature to students who have come to realize that they know very little of the action of muscles in spite of all the time spent in learning detailed anatomy.

Among the special exercises described for the back the span-bendings are dearest to the author's heart, for they are the most valuable of all, and he urges parents to give their children sets of wall-bars at the earliest opportunity. He feels that rhythmical work, although attractive for children, is not sufficient for their development, and if given exclusively is apt to result in slipshod, "sloppy" action. The author is insistent that physical education should primarily be concerned with the individual and is therefore unsuitable for spectacular class shows. Physical training that is good for the various individuals in a class seldom makes successful show-stuff. Schools, please note!

VITAMINS AND HORMONES

Ergebnisse der Vitamin- und Hormonforschung. Vol. i. Edited by L. Ruzicka and W. Stepp. With a Foreword by Sir Frederick Gowland Hopkins. (Pp. 470; 44 figures. RM. 33; bound, RM. 34.) Leipzig: Akademische Verlagsgesellschaft M.B.H. 1938.

In this monograph on the vitamins and hormones recent developments in these studies are brought together in the form of brief reviews by people who have been working closely on each subject. It is essentially a series of contributions from experts rather than a unified whole. Sir F. Gowland Hopkins contributes a reminiscent foreword. The emphasis is almost entirely biochemical rather than clinical. E. Glanzmann of Berne contributes a section on important vitamin problems in childhood. Vitamin C is dealt with by D. Giroud of Paris, vitamin B_1 by R. R. Williams of New York, and the remainder of the B vitamins by C. A. Elvehjem of Madison; the vitamins concerned with reproduction are dealt with by H. Guggisberg of Berne. H. von Euler of Stockholm contributes a section on the significance of enzymes in cell life. The hormones are represented by a discussion of the chemistry of posterior lobe hormones of the pituitary gland by R. L. Stehle of Montreal, a section on the interrelationships between the hypophysis and the sex glands by W. Berblinger of Jena, the chemistry of cortin by T. Reichstein of Zurich, and sections on the chemistry of the male and oestrogenic hormones contributed respectively by M. W. Goldberg of Zurich and G. F. Marrian of Toronto. Each author uses his own language.

The rather strictly biochemical bias of the book makes it of greater interest to those who are engaged in biochemical and strictly biological research than to the clinical worker. Work upon the vitamins and hormones has become so complicated and specialized that there is a positive value in bringing together contributions from so many different fields. As Sir F. G. Hopkins says, it is logical that vitamins should be associated with hormones in a volume such as this. The brevity required to fit so many contributions into a single volume has the disadvantage of making some of them incomplete. It is surprising, for example, to turn to the section on anti-anaemic factors in the contribution on the B vitamins and to find that there is no reference at all to the interesting problem of the nature of the extrinsic factor involved in the aetiology of pernicious anaemia.

RUDIMENTS OF ANATOMY

Fundamentals of Anatomy. By Carl C. Francis, A.B., M.D. (Pp. 320; 176 illustrations, including 26 coloured plates. 12s. 6d. net.) London: Henry Kimpton; St. Louis: C. V. Mosby Company. 1937.

This elementary book by Dr. Carl C. Francis of the Western Reserve University, Cleveland, is designed to give the student a general knowledge of the essentials of anatomy. It is clearly written and illustrated, many of the figures having been specially drawn from specimens in the museum of the Western Reserve University. As stated in the preface, it is evident that "every effort has been made to keep the text concise." In effecting this, however, much that in our opinion is vitally essential has been omitted, and many details of anatomy a knowledge of which is important for the operative work of a practical surgeon are lacking.

In this type of book brevity in many instances leads to a mere enumeration of facts which, without any explanation of their practical or scientific bearing, become devoid of interest. We need only mention as an illustration of our meaning the additional interest which is brought into the study of the odontoid process of the axis vertebra when something is told of its mode of development and phylogeny. In justice, however, to the present work we may state that the text as a whole is remarkably free from errors, and that it contains in a very limited number of pages a large amount of information which is expressed in a simple, lucid style, and that this, combined with the clear printing in full of the names of the parts indicated in the illustrations, should prove of the utmost value in saving the reader time and trouble. Books of this type should prove serviceable as an introduction to anatomy for ambulance workers and nurses, but in our opinion the descriptive anatomy for medical students cannot be cut down to a minimum without seriously lowering the general standard of medical education.

APPLIED MYCOLOGY AND BACTERIOLOGY

Applied Mycology and Bacteriology. By L. D. Galloway, M.A.Cantab., and R. Burgess, M.Sc., Ph.D.Lond. (Pp. 181. 10s.) London: Leonard Hill, Ltd. 1937.

Although it is a truism to say that microbiology has many important applications, it is one which is not always fully appreciated. We in medicine are apt to forget that, while the study of micro-organisms developed principally in its application to medicine, bacteria and fungi have other activities no less important to man. This one-sided development of microbiology, and more particularly bacteriology, has been remedied to a considerable extent of late years; the study of bacteria and fungi in relation to agriculture and industry receives more and more attention. Undoubtedly there are many whose work brings

them into contact with microbiological problems but who are debarred from taking an intelligent interest in them owing to a lack of knowledge, and it is for such people that Messrs. Galloway and Burgess have written this small book.

The authors begin with a brief description of bacteria and fungi and their classification. This is followed by chapters devoted to the technical side of the study of micro-organisms, and the first part of the volume closes with chapters on the metabolism of bacteria and fungi and the methods available for the control of these micro-organisms. Part II is concerned with the applications of our knowledge of bacteriology and mycology to the food industries, to fermentation, textile industries, medicine, and agriculture. Naturally in the space of 173 pages these matters can only be treated in bare outline, but it is detailed enough for its purpose, and the information given is well chosen and well arranged. For students of medicine its main interest is that it presents the study of bacteria and fungi in its true perspective, and not solely in its relation to disease.

Notes on Books

Short Years. The Life and Letters of John Bruce MacCallum, M.D., by ARCHIBALD MALLOCH, is published in Chicago by Normandie House, price 3.50 dollars. This charming record, as shown by the letters and the running commentary, of a talented medical man, who, though already distinguished as a histologist and a physiologist, died before he reached his prime more than thirty years ago, has evidently been a labour of love to the librarian of the New York Academy of Medicine. Dr. John, who was a brother of W. G. MacCallum, the successor of W. H. Welch as professor of pathology at the Johns Hopkins University, was a man of many interests. He was a good correspondent of the old-fashioned model, not of the concise telegraphic style of these days of universal hurry. His letters, fortunately preserved by his family, those to parents usually beginning "Dear Home," have been extensively utilized by Dr. Malloch to tell the story of a life much handicapped and cut short by tuberculosis. With a circle of devoted friends he was cheerful and affectionate, but his face showed lines of sadness, and his notebooks and poems, such as that beginning "Spirit of Death," now carved on his tombstone of grey granite, bear out the accuracy of this index of the inner man. His poems, as quoted in the volume, are attractively arresting, and two prose stories, also incorporated here, show talent of a rather unusual kind. He was an admiring pupil of Osler, who nicknamed him "St. John" and wrote of him: "He was one of the most brilliant young men it has ever been my lot to teach."

The richly documented work entitled *Coming into Being among the Australian Aborigines* (London: George Routledge and Sons, Ltd., 21s.), by Dr. M. F. ASHLEY-MONTAGU, assistant professor of anatomy, New York University, is, as its subtitle indicates, a study of the procreative beliefs of the native tribes of Australia. The author has tried to collect all the available evidence relating to the procreative beliefs of the Australian aborigines, and he confirms the truth of Spencer and Gillen's observations published in 1899 that there are aboriginal people in Australia without any knowledge of the relation between coitus and pregnancy. The objections which have been raised against the existence of such ignorance are critically examined by the author, who shows that the procreative beliefs of the Australians form only a special case of the belief in the supernatural birth which is by no means peculiar to Australian aborigines. In a chapter on phallic ceremonies or so-called phallic worship it is shown that their performance, so far from indicating a knowledge of the relation between intercourse and pregnancy, is merely a ritual sort of sexual pleasure, while in the following chapter on the operation of subincision or slitting open the penile urethra on its ventral surface the author maintains that the operation is not intended as a contraceptive measure, but was instituted to cause the male to resemble the female with respect to the occasional effusion of blood and possibly to produce some feminization of the male organ. Professor Malinowski, to whom, in conjunction with Professor Westermarck, the volume is dedicated, recommends it as "the best introduction to anthropology, indeed to the study of social science."

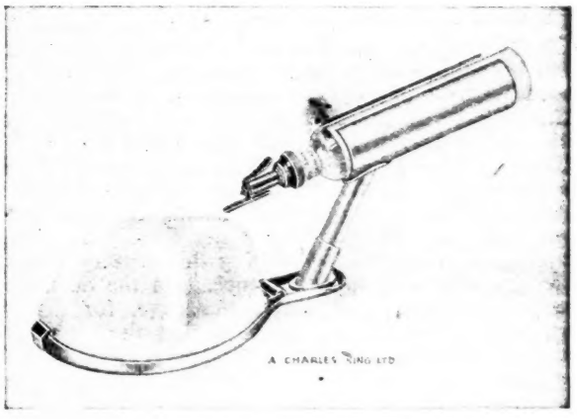
Professor HARRY BECKMAN'S well-known volume *Treatment in General Practice* has now appeared in a third edition, revised and entirely reset (Philadelphia and London: W. B. Saunders Company, 42s.). Though many more items are included in it the text occupies fewer pages than its predecessor of 1934. The book contains a great deal of close-packed information; every disease is given its separate heading, and the appropriate treatments are set out in some detail. There are a number of new sections, others are regrouped, and obstetrical matters are now wisely omitted as being out of place in a book whose scope is already quite large enough. A further lease of popularity seems assured.

Preparations and Appliances

ETHYL CHLORIDE ANAESTHETIC MASK AND HOLDER

Dr. P. E. WOODROOFE (Bradford) writes:

This mask obviates the necessity for using both hands for the administration of ethyl chloride, by combining a mask and a holder for the ethyl chloride bottle. As I consider there should be continuous spraying till the depth of anaesthesia required is attained, the angle of the holder to the mask has



been so devised that whatever the position of the patient the ethyl chloride bottle is in action to the last drop. The holder is grooved so that the contents of the bottle can easily be observed. The mask and holder are chromium-plated, light, and durable. The mask is made in two sizes—a medium size for adults or older children and a smaller one for young children. The holders, which fit either mask, have been made to fit the standard ethyl chloride bottles. A strip of gauze or felt can easily be inserted for any bottle not fitting tightly in the holder. A gamgee tissue pad can easily be attached to the mask by a rubber band at each end. Further details may be obtained from A. Charles King, Ltd., London, W.1, whom I wish to thank for their co-operation in making this instrument for me.

PHYSICAL EDUCATION*

BY

VISCOUNT DAWSON OF PENN, M.D., P.R.C.P.

As regards modern days, physical education may be said to have originated in Denmark, when in 1804 it was made an essential part of the curriculum in the national schools. Soon after came Ling, who designed a scheme of gymnastics based on his study of anatomy and physiology, and in 1813 became Director of a Central Institute in Stockholm. From this parent system physical training extended into various countries and developed in accordance with the needs and ideas of different communities. On the other hand, in Great Britain, so long and pre-eminently the home of games and sports, the idea of physical education fell on stony ground, and this country remained absorbed in its own ways.

In the course of the years which followed, Ling's system was found to be too static, formal, and sombre, muscular effort being regarded as an end in itself; and so arose in the year 1915 the gymnastic movement in Denmark of which Niels Bukh was the founder. Niels Bukh used planned exercises (gymnastics) to secure good posture, muscles strong and apt for the functions they had to serve, and rhythmic gymnastics to teach balance and grace of movement. On this basis of designed and directed training Bukh employed athletics, games, and folk dancing as a means of its expression. Thus was secured not only strength, suppleness, and even beauty of frame—the body giving the quick expression of the mind's behest—but also the team spirit, and withal joy in the doing.

The English Paradox

It is interesting here to note that this system of Niels Bukh—namely, a combination in varying measure of physical training with games and sports—is, in Great Britain, held to be the correct comprehension of physical education. Indeed, in most countries physical training is organized side by side with games, sports, and the cult of the outdoor life. Meanwhile, England has presented a curious and conflicting spectacle.

On the one hand, the Board of Education, starting from small beginnings about thirty years ago, has steadily extended its field of physical education. With knowledge gathered from the great war it reformed its conspectus in 1919, and to-day physical education, based on a notably widened syllabus of 1933, occupies an important place in the curriculum of the elementary schools, though the Board of Education urges that existing facilities are far from adequate. Further, the Army School of Physical Training at Aldershot has, during this century, acquired increasing reputation and influence. On the other hand, our public schools and universities have, for the most part, held obstinately to the view that their traditional and great institutions of games and sports are all-sufficing, and they have been slow to admit that these need to be supplemented by planned basic physical training.

Amid this divergence of opinion and practice of the Board of Education and the public schools and universities, public opinion has remained indifferent until this recent generalized awakening to the conviction that the standard of national fitness can and must be raised, and that in large measure this can be achieved by physical training, games, sports, the provision of playing fields, and, in general, the cult of open-air activities. As is natural, this rising enlightenment lacks as yet a direction proportional to its force, and so carries with it the risk of unguided and ill-judged efforts which might detract from the benefits to health so keenly desired and expected.

* Opening address in a discussion at the Section of Physical Medicine, Royal Society of Medicine, March 18, 1938.

Thus arises the importance of the medical profession making this subject its own, as bearing on the constructive health of the nation; for the knowledge of the development and growth of the body rests on the medical sciences, and there is a large field which, in the interests of physical education, needs to be explored. The medical man is an educationist of the body, just as the schoolmaster is an educationist of the mind, and they must work together.

The Government, convinced that the development of better physique was essential to the welfare of the nation, had the alternatives of imposing a plan of physical education from the centre, or of integrating existing local activities by propaganda and money grants. The latter course, which was the one adopted, has the disadvantage of being slow and cumbrous, and of provoking impatience and charges of inertia from lookers-on. On the other hand, the adoption of a central plan would have disorganized innumerable local activities, antagonizing rather than enlisting their sympathies, and might have raised the bogy of disguised militarism. And so the National Council for Physical Fitness pushes forward, under the able guidance of Lord Aberdare and Captain Ellis, with the building up of a nation-wide scheme of educative and recreative physical training.

Relation between Physical Training and Games

Team games and sports which carry no conscious purpose of physical training, but are played for their own sake and the love of the game, excel in training the mind in alertness, concentration, and decision, the body to quickness of response, and in arousing a sense of joyous struggle coupled with the discipline of playing for the side—altogether a harmony of body, mind, and character. On the other hand, proficiency in games is compatible and often exists with defects of frame or function. Even though such defects may not make themselves felt at the time, they may easily become a progressive handicap when manhood is reached. Again, games, unless correlated with basic physical training, can overstrain their votaries. The frame of a youth whose spirit outstrips his strength can be damaged by over-devotion to sport, and especially to one sport. With games in schools there is a tendency to focus attention on the boys who have the aptitude to play well. This, however inevitable, makes it the more necessary that the boy who is mediocre or dull at games should receive adequate physical training, or he will leave school with an uneducated body. And well-taught physical training is no dull exercise, but quickens and interests the mind and brings the exhilaration of effort. The same consideration applies to those classes of people whose opportunities for games and sports are scanty.

Sports and games are the fulfilment of physical training and should rest upon it, for planned physical exercises increase the strength, control, and response of the body and improve the form and style of the athlete. Moreover, physical training develops certain qualities which are basic to sound physical education: such are posture, poise, flexibility and rhythm of movement, and efficient respiration.

Posture

Good posture, whether standing or sitting, is not an innate quality. It has to be taught. This may be due to the fact that the development of the erect attitude is a recent chapter in the history of evolution. Good posture is characterized by stillness though not stiffness. It is effected by muscular tone, a reflex made up of afferent impulses from the sense organs of the muscles and, less important, from the ears and eyes, to the brain and efferent impulses which emerge from the cells of the anterior horns. The discharge of the efferent impulses for the maintenance of this muscle tone would only need to be slow, and therefore could be the longer maintained without muscle fatigue. It is said that the oxygen consumption and carbon dioxide output of muscle so

functioning is only 25 per cent. higher than that of paralysed muscle. Training gives to the various groups of muscles which together maintain good posture—say, in the erect position—strength, control, and co-ordination; there thus arises a postural sense which prompts the right balance of muscular tone. Good posture, at first the result of conscious effort, maintained by the cortex, passes gradually into an unconscious habit (reflex), maintained in the mid-brain, and as it does so makes manifest an ease of effort, a balance and poise which give to the body strength and beauty. Good posture is then assumed naturally whenever movement ceases, and gives repose without producing fatigue.

It may almost be said that, given good posture and good carriage (gait), all other things shall be added unto you, for these are the conditions which enable the body to grow up symmetrical and flexible, pursuing its activities with ease and graceful effort, and allowing the possessor to hold his head erect and go through life with confident step. Thus do body and mind move together.

To maintain good posture muscles and nerves must be well nourished and adequately rested. This means food adequate in quantity and quality, sufficient hours of sleep —often lacking—fresh air, and recreation which gives the body exercise and the mind diversion. And side by side with the muscle tone of good posture is needed the aptitude for muscle relaxation, which is precedent to repose of mind. So often muscles and mind remain taut after work has finished—a frequent cause of strain and exhaustion. For a study of good posture, standing or sitting, or again of complete relaxation, witness a well-bred sporting dog.

Physiological Foundations

No system of physical training so far put forward has rested, or could rest, wholly on physiological data; rather have the methods been evolved from observation and experience from the days of Ling onwards. The time has come for them to be surveyed, and where necessary modified, in the light of firmly set physiological knowledge. Though it is right there should be a lag between the conclusions of experiment and practice, the lag here is too long.

Research into various aspects of educative and recreative training increases each year; in particular the field of knowledge has been enriched by a study of athletes—for instance, in the spheres of metabolism, circulation, and breathing. I will put forward certain illustrative examples for the purposes of discussion. It is known that sugar given to soldiers on long marches enables them to carry on longer without fatigue. Hansen has found in experiments on athletes that to obtain the maximum output there should be two days' rest before the effort, so as to raise glycogen reserves to their highest point. Sugar given at the time of the effort is not so effective. Next, the period of rest needed after a big effort; Boigey gives the results as follows:

After a 100-metre race the rest required varies from half an hour to two hours. After a 3,000-metre race lasting nine to eleven minutes it ranges from three to fifteen hours, according to the training. On the other hand, results of observations on blood pressure before and after athletic efforts are varied and discordant, and some of the figures do not agree with the experience of clinical practice.

There seems to be agreement that during training the basal metabolic rate increases. As training reaches its completion does the rate decrease? It should do so, as the machine "runs in"—that is, works more efficiently.

Metabolism of Muscle

Passing to the metabolism of muscle, may I recall that glycogen hydrolyses into glucose; glucose combines with phosphoric acid to form lactacidogen, which, in breaking up into lactic acid and phosphoric acid, releases the energy for contraction. After contraction oxygen comes into the picture and breaks down the lactic acid into carbon dioxide and water (though only to the extent of 20 per cent. with a full oxygen supply). Unless, for example, there is an adequate supply of oxygen the lactic acid content increases, till sooner or later it reaches the fatigue reading. After the start of an exercise (for example, gentle running) if the lactic acid content of the muscles is not to increase to the point of fatigue there must be a larger supply of oxygen from the blood and therefore from the air. Soon this supply reaches its limit, and then the supply and expenditure of oxygen are balanced. But the body can incur an oxygen debt by delayed payment and exercise can continue. The limit of debt will vary from a few cubic centimetres to 12 or more litres, according to the subject and his degree of training. "Thus" (to quote Griffin) "a man's ability to take in oxygen from the air and to accumulate an oxygen debt determines how much strenuous work he can do without exhaustion." Here then, thanks to A. V. Hill and his collaborators, there comes into view a scientific basis for physical training.

The supply of oxygen to the muscles depends: (*a*) on the power of the blood to load and unload oxygen—a power which is increased by fresh air and exercise; (*b*) on the output of the heart and blood vessels; (*c*) on the efficiency of respiration, measured in part by the vital capacity. This last depends more on the flexibility of expansion than on size of chest; on the thorax moving not as a whole but by its individual parts: on the intercostal muscles and diaphragm being strong and well co-ordinated. These circulatory and respiratory processes belong to the sphere of basic physical training, which will condition success in games and sports.

Training of Teachers

I have endeavoured by the foregoing illustrations to show the importance of the newer knowledge with which physical education needs to be brought in contact, and it will be agreed that education and research should go hand in hand. If this is to be a nation-wide movement there must be not only more but the best provision for the training of teachers and others concerned in educative and recreative training. Our existing services of physical education and their leaders and teachers stand high in reputation, but these services have not been accepted as of prime national concern in the way that Sweden and Denmark have accepted theirs for generations past and with great benefit to the well-being of their peoples.

It is public knowledge that our Government has decided to establish a national school of educative and recreative training, and that the Board of Education is actively concerning itself with the realization of that project. Here teachers of anatomy and physiology will work side by side with teachers of physical training—science and art harnessed to the same chariot. Here will be studied the total functional value of the individual having regard to his make-up and environment. And more—physical education will concern itself with the whole man; in the words of Montaigne:

> "I would have his outward behaviour and mien and the disposition of his limbs formed at the same time as his mind. It is not a soul, it is not a body that we are training up; it is a man, and we ought not to divide him into two parts, nor fashion one without the other."

Physical education, if it is to go aright, will need the responsible guidance of trained doctors. In the future those who aspire to be medical officers of schools will require to include in their training a knowledge of physical education, and would profit by a course of instruction in the National College.

To my younger colleagues at the outset of their careers there is opening a new sphere of action. Whether viewed

as a specialty within general practice or as a part of those sociological aspects of medicine which are certain to come into increasing prominence year by year, it will be work of interest and usefulness; and from a scientific point of view the physiology of toil and leisure presents an attractive field of investigation.*

And, lastly, the knowledge gained by trained observation and research at the college will also be available for those problems of work and recreation which arise with the development of modern industry. And may I repeat that physical education must never lose contact with the cognate subjects of right feeding and adequate repose, for the study of which the college will afford opportunities.

The Why and the Wherefore of Physical Education

It may be said—why this concern about physical education? Every man endowed with health, strength, and endurance is not only a life enriched in capacity for efficiency and happiness, but, *ceteris paribus*, a citizen of greater value to the State. From the racial point of view the fact that civilization tends to preserve the weaklings and does not conform to the laws of sound breeding makes it the more important to train and multiply the fit and push them to the forefront; in fact "planning" to this end must be the policy of a modern State.

Thus nurture and education, both of body and mind, have a big task before them, and that task is heavier for certain sociological reasons—for instance: (*a*) Increasing urbanization, with its limitations of space, air, sunshine, and the greater tensiveness of its life. (*b*) Increasing specialization in industry, which leads to the over-exercise of a part of a man and the under-exercise of the whole man. Machinery so often demands concentration of attention in a limited and even monotonous sphere of action, while leaving the creative, thinking part of the mind barren—and with this a cramped body. Speed encourages the ready-made rather than the self-made in thought and action. And, in general, man's power of adaptation lags behind the rapid changes in material civilization. In 1933 Sir George Newman laid down five conditions fundamental for the success of physical training, and the first of these was: "The Child Must be of Good Stock." In this country we are ignoring the implications of this tyrannical fact, just as years ago we ignored physical training when Scandinavia was up and doing.

Measures we Might Take

Measures within our reach are: push to the forefront the best of the youth—youth leaders would create a standard for their own generation; consider the granting of loans (already working in Germany) to medically approved marriages, the obligation to repay being reduced with the birth of each child; institute motherhood clinics to give the light and leading of knowledge. In short, plan for quality of stock—a quality which would preserve the attributes of individuality and initiative.

Again, where posts and positions are filled through competitive examination such an examination should be a test not only of the mind but also of the body. Take entry into the Civil Service. It is part of the Government programme, supported by all parties, to promote physical education and national fitness. What an opportunity to put this programme into practice, and thereby bring fit and clever youth to the forefront, to the advantage of the service and nation. What an impetus this recognition of physical education would give! The world would go and do likewise.

Present medical examinations for entry into the civil services set out to ensure the absence of diseases and defects. Rather should a physical examination answer the question: "Which of these bodies are sound in structure and so well grown and so well trained as to carry out efficiently and well the mind's behests, and in which order of priority would I place them?" We want no standard type of body: we need to recognize that there is an individuality of body just as there is of mind; we must think of quality, proportion, and effectiveness, not merely of size. A young man's body—*his* body—if sound, well grown, and well educated, will not groan under effort but will enjoy it and be more likely to house a mind free, forthcoming, and strong.

* In this connexion I would point to the excellent work which has been done by the British Medical Association through its Physical Education Committee under the Chairmanship of Sir Kaye Le Fleming.

TUBERCULOSIS SCHOLARSHIPS IN ROME

The Italian Fascist National Federation against Tuberculosis places at the disposal of the International Union against Tuberculosis six scholarships at the Carlo Forlanini Institute in Rome. The conditions are as follows:

These competitive scholarships, of a value of 2,000 lire each plus board and lodging, are intended to enable foreign medical practitioners to stay at the Carlo Forlanini Institute for the purpose of following a course of studies. This stage of eight months will correspond with the academic year (from November 15 to July 15), including the usual holiday periods. The scholars reside at the Institute.

The scholarships are preferably awarded to young physicians already familiar with tuberculosis problems who wish to improve their knowledge of this branch of medicine. The kind of work undertaken at the Institute will be subject to an agreement between the Director of the Institute and the candidate. Papers resulting from this work must be submitted for publication in the first instance to the editor of the *Bulletin of the International Union against Tuberculosis*.

The six scholarships will be awarded at the next session of the Executive Committee on July 11, 1938. The names of candidates, accompanied by particulars as to their age, qualifications, and professional experience, must be forwarded to the Secretariat of the Union, 66, Boulevard Saint-Michel, Paris, not later than July 1. No candidature will be taken into consideration unless it has been forwarded to the Executive Committee by a Government or an Association belonging to the International Union. The address of the British National Association for the Prevention of Tuberculosis is Tavistock House North, Tavistock Square, W.C.1.

E. Burack and H. M. Zimmermann (*J. Nutrit.*, December, 1937, p. 535) have investigated the effects of prolonged feeding of large amounts of cod-liver oil to rats and mice fed on controlled diets. Rats taking 27 per cent. and 18 per cent. of cod-liver oil in their food did not grow so well as those on a comparable diet in which the cod-liver oil was replaced by peanut oil and vitamin concentrate. The adverse effect of the cod-liver-oil-containing diet was not countered by liberal intakes of yeast and was directly related to the amount of food consumed. Similar results were obtained in mice, but there was no correlation between body weights and food consumption. Of fifty-two mice fed for at least 150 days on diets containing 20 per cent. of cod-liver oil, some showed pathological changes—necrosis, fibrosis, or accumulations of phagocytosed fat or pigment—in heart, liver, and spleen, and slight changes in skeletal muscle, but there was no renal calcification. These changes were absent in the thirty-four control mice. The results in a small group of rats were similar, but some control rats showed myocardial fibrosis. The authors incline to the view that the effects produced by cod-liver oil are to be related to the irritant nature of the oil rather than to the production of hypervitaminosis, and conclude that the claims that cod-liver oil in therapeutic doses can do harm are not substantiated.

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PSITTACOSIS AGAIN

It is perhaps not generally realized that since the epidemic of 1930 died down cases of psittacosis have been occurring in this country. It is true that the number of cases has not been great, but it is significant that there should have been any at all: in some European countries less fortunate than our own—for example, Germany—cases of psittacosis have been numerous. In view of the recent articles in the lay press concerning a suspected outbreak of psittacosis in the London Zoological Gardens, it might be of interest to consider the mode of spread and control of this disease in the light of present-day knowledge. The epidemic eight years ago was the result of the introduction into this country of diseased birds from South America. The investigations made possible by that epidemic showed that psittacosis was due to infection with a filterable virus which was excreted by the diseased birds in their droppings; and the epidemiological data, together with the fact that in the human disease the respiratory system was principally involved, pointed to the respiratory tract as the portal of infection in man. From what was known then it was thought that this country could be kept free of psittacosis by strictly controlling the immigration of birds of the parrot family, and in this conclusion we were not alone, for other countries also placed an embargo on the importation of parrots and parakeets. This policy has failed, and its failure is due to the fact that it was based on two assumptions, both of which have proved false. The first was that the home-bred birds were free from infection. Whether they were free from infection before the 1930 epidemic it is difficult to say; probably they were not; but they are certainly not free from psittacosis now. The second assumption was that a bird which appeared healthy and remained in good health during a period of quarantine was not infected and could safely be admitted to this country. This overlooked the possibility that healthy carriers of psittacosis might exist. Already in 1930 there was evidence that such a carrier state could exist in birds of the parrot family, for one of the cases investigated at the London Hospital was shown to have arisen from contact with an apparently healthy bird. Although the virus was not isolated from this particular bird, and although it was thought that intimate contact between man and a healthy carrier bird would be necessary for infection to take place, subsequent work has shown that the danger of infection from carriers is a very real one. The budgerigar, in particular, when exposed to infection tends to suffer from a subclinical rather than a frank attack of the disease. A carrier state is readily set up in these birds, and it is from such apparently healthy carriers that many of the human cases have arisen during the last few years. There is perhaps a danger that the importance of this disease as a public health problem may be exaggerated. For some reason or other "parrot fever" has considerable news value, and thus attracts a publicity which is hardly warranted by the number of cases that occur. All the same, it is a serious disease with a high mortality rate, and all possible preventive measures should be taken against it.

What, then, can we do effectively to control psittacosis? It is obvious that strict control of parrots and parakeets coming into this country, with an adequate period of quarantine of those birds admitted, is by itself inadequate. All this can do is to safeguard us against a repetition of the happenings of 1930. Possibly the periodic inspection of the stock possessed by bird dealers and the laboratory investigation of all deaths in birds of the parrot family, with destruction of the contacts in aviaries or bird shops where there have been cases of psittacosis, would in time materially reduce the incidence of the disease. But the public should know that the matter rests very largely with them. Those who do not wish to run the risk of this disease should not keep these birds in their homes; and in this respect it should be pointed out that other species of birds, such as canaries and various finches, though not subject to psittacosis in the wild state, are susceptible to this virus and will contract the disease when brought into contact with infected psittacines, so that any such birds coming from dealers who possess a mixed stock which includes parrots and parakeets are suspect. What should be done to safeguard the public who visit the parrot houses in zoological gardens is another matter. There is no evidence that any visitor to the parrot house in the London Zoo has ever contracted psittacosis, but in theory at any rate the danger exists. And in order to minimize or exclude this risk it might be advisable to take further measures than those hitherto in use.

SHELLFISH AND THE PUBLIC HEALTH

The description by Lewis Carroll (C. L. Dodgson) of the young oysters—" Their coats were brushed, their faces washed, their shoes were clean and neat "—came to mind on hearing Dr. R. W. Dodgson's account, given at a meeting of the Epidemiological Section of the Royal Society of Medicine on March 25, of how shellfish have been persuaded to perform their own toilets in readiness for the human market.[1] It has long been known that if oysters are grown in estuaries they easily become infected with typhoid bacilli derived from sewage, and it was found by artificial inoculation that the germs thus introduced survive in the body of the mollusc for several days. Dr. Dodgson, who was lately director of shellfish services in the Ministry of Agriculture and Fisheries and is now consultant in that department, said that without doubt shellfish from polluted beds are potential vectors of enteric fever and other diseases, and large numbers of people are suspicious of all shellfish on that account—a prejudice which sometimes becomes accentuated, as during the recent outbreak at Croydon. Some thirty or forty years ago Conway mussels had an evil reputation, so much so that the fishery was closed in 1911. Experiments in artificial purification were then started, resulting in a satisfactory system which has been in continuous operation at Conway for twenty-three years, and elsewhere for shorter periods, and during the whole of that time no complaint of illness attributable to the purified shellfish has been received.

Dr. Dodgson described the process of purification of mussels and oysters, premising that the shellfish did not undergo any deterioration in taste or keeping quality in the process. The mussels are spread by the fishermen on wooden grids in large concrete tanks, and after hosing to remove mud are given a bath overnight in sea-water sterilized by chlorine and dechlorinated with sodium thiosulphate and again hosed to remove dejecta. The procedure is repeated over another night, including a third hosing, and a final bath is given in treated sea-water to sterilize the outsides of the shells, after which the shellfish are transferred to sealed sterilized bags. The purification of oysters is just the same, except that a multiple-jet hose is used to scour under the flat shells; but in winter the purification of oysters is carried out in covered tanks, oysters failing to open, function, and eliminate satisfactorily at lower temperatures at which mussels are quite happy. The principle of the purification is merely that the shellfish are given baths of clean salt water in which they conduct unaided their own process. It is said that a single mussel can filter ten gallons of water in twenty-four hours. The secret of the efficiency of the purification process lies in the fact that the bacteria are discharged imprisoned in the mucous material of the faeces and pseudo-faeces, which is practically insoluble in water. Several other methods of artificial purification have been devised, but most of them abandoned as failures or carried on only in a desultory fashion, owing to a failure to realize the physiological principles involved.

Coming to bacteriological considerations, Dr. Dodgson put forward the view that the real criterion in judging the suitability of shellfish for human consumption was the pollutability of layings, bacteriological examinations being merely complementary and sometimes misleading. A standard of purity for purified mussels had been set up (namely, not more than 5 lactose factors per 1 c.cm. of minced shellfish incubated at 37° C. for twenty-four hours). Oyster purification judged by even this stringent standard had approached perfection, but with regard to mussels there had on three occasions been encountered anomalous periods during which the counts became fantastically high. No fault was to be found in the purification operations, and the mussels themselves were functioning vigorously and normally. All colonies tested during these periods belonged either to the cloacae or aerogenes types, and it was found that organisms of these types might at times multiply enormously in mussels, barnacles, and raw sea-water. Dr. Dodgson's opinion was that these anomalous periods were not important in the public health aspect, and in any case, as there was no clue to the nature of the conditions determining them, it was impossible even to begin to legislate for them. Oysters had never shown any anomalous results; the fact that they carried no barnacles might be significant or might not. The possibility of the multiplication, or even bare survival, of organisms of the typhoid group has again been explored. Several strains have been used, including the *Salmonella typhi* isolated in the Croydon outbreak. Neither in raw nor in autoclaved sea-water has any multiplication been observed, nor has survival beyond two or three days been noted.

Dr. Dodgson considered that in view of recent findings there could be no legitimate standard of purity for purified shellfish based on tests carried out at a temperature of 37° C.; in his view a satisfactory test could be found in incubation at 44° C., at which temperature all the citrate-positives derived from shellfish—that is to say, the group comprising the " multipliers " responsible for the anomalous results—are eliminated. He mentioned the resolution passed in the Section of Public Medi-

[1] See also R. W. Dodgson, *British Medical Journal*, 1936, **2**, 169.

cine at the Oxford Meeting of the British Medical Association in 1936, subsequently passed on to the Ministry of Health, urging the adoption of measures designed, in the interests of public health, to grapple with the present unsatisfactory shellfish position. He submitted that, failing a better, the method he had described, which was approved by the Ministry of Health and the Ministry of Agriculture and Fisheries, offered a ready means of putting such a resolution into effect. The method, he said, was simple and practically foolproof in operation and economically sound, and experience over nearly a quarter of a century had afforded strong cumulative evidence that it was an adequate safeguard of the public health.

EPHEDRINE

In his Sidney Ringer Memorial Lecture, which appears in our opening pages this week, Professor J. H. Gaddum propounds a new theory of the action of ephedrine. Ephedrine, we may remember, is built very like adrenaline, and in a general way its effects are qualitatively similar. Professor Gaddum's theory is most rapidly grasped by considering the recent evidence that the parasympathetic nerves act by liberating acetylcholine, the chemical transmitter of the nervous impulse; when it has transmitted the impulse it is rapidly destroyed by an esterase. Now physostigmine or eserine has the property of inhibiting the action of this esterase, so that after the injection of eserine impulses proceeding along parasympathetic nerves have a greater effect than before because the acetylcholine which they liberate is not destroyed so quickly. Nerves to striated muscle also act by liberating acetylcholine, and physostigmine or the allied substance prostigmine is for the same reason beneficial in myasthenia gravis. In the sympathetic system the chemical transmitter is adrenaline or a very similar substance. Having transmitted an impulse, adrenaline is then destroyed by an enzyme known as amine oxidase. Gaddum's theory is that ephedrine inhibits the action of amine oxidase, so that after the injection of ephedrine sympathetic impulses exert a greater effect than before, because the adrenaline they liberate is not destroyed so quickly. Hence Gaddum's suggestion is that the relation of ephedrine to the sympathetic system, or, more correctly, to adrenergic nerves, is like that of physostigmine to cholinergic nerves. The evidence for this view comes in the first place from the work of Blaschko, Richter, and Schlossmann at Cambridge, who have shown that amine oxidase destroys adrenaline but not ephedrine, and, further, that in the presence of ephedrine amine oxidase does not destroy adrenaline. (It is, however, at present an assumption that amine oxidase is the principal enzyme which destroys adrenaline in the tissues.) Subsequently, Gaddum and Kwiatkowski, experimenting with rabbits' ears perfused with Ringer's solution, stimulated the sympathetic nerves and observed that during stimulation the venous outflow contained an adrenaline-like substance detectable by a sensitive colorimetric test devised in Gaddum's laboratory by Shaw. When the nerves were stimulated in the presence of ephedrine the venous outflow contained a much higher concentration of the adrenaline-like substance. Gaddum and Kwiatkowski have also shown that ephedrine augments the effect of sympathetic impulses to the frog's heart, to the rabbit's ear, and to the cat's nictitating membrane. For the additional evidence for Gaddum's view the lecture should be studied.

THE SPAN OF LIFE

In the *United States Public Health Reports* of December 3, 1937, there is an interesting summary of life tables constructed during the last 150 years from data collected in America. The early tables, being based upon scanty material and constructed on unsound lines, are merely suggestive, but since the beginning of this century much has been done. The general results—a considerable increase of expectation of life at birth, a lessening superiority of rural over urban districts—are similar to those of European experience. A point is, however, made which suggests some interesting reflections. The authors distinguish between the average number of years lived and the "span of life"—the maximum length of life attainable. "So far as it is known," they remark, "there has been no increase in the span of life; persons living to advanced ages do not live a greater number of years now than formerly. The exact length of the span of life is unknown. It is somewhat more than 100 years, but how much more cannot be said." This subject has been recently discussed by the eminent mathematical statistician Dr. E. J. Gumbel.[1] Dr. Gumbel's work is mathematical, and his definition of the extreme age involves the increase of this limiting age as the population increases (there are good reasons for this definition, but they are of too technical a character to be discussed here). Like most mathematical students of the problem he declines to believe that there is any finite limit to age, but the adoption of widely different hypotheses as to the relation between age and rate of mortality makes very little difference to the arithmetical results. None of his calculations brings one within sight of the traditional age of Thomas Parr, perhaps the one person who secured admission to the *Dictionary of National Biography* solely by reason of longevity, while from the reliable Swedish data his *dernier âge* is found to be 104 years for males and 106 for females. A certain paradox of the method is that, other things equal, the worse the life table the greater the *dernier âge*. A reason is that the better the mortality experience the less the scatter of deaths around the maximum. We seem to be tending towards the ideal humorously attributed by Mr. Max Beerbohm to the Socialist State in which all men should live exactly the same length of time. But we are approaching this ideal without the need for using a municipal lethal chamber. The approximation is, however, not very close, and the theory might perhaps be improved. The obvious difficulty of any investiga-

[1] *La Durée Extrême de la Vie Humaine*. Paris: Hermann et Cie. 1937.

tion is the fact that data of mortality rates at ages over, say, 90 are scanty and inaccurate. Indeed most population life tables are at the oldest ages works of art rather than nature. Biologically speaking, our knowledge of the processes of senescence is very incomplete. It seems, on the whole, probable that the increase of the rate of mortality with age slackens, but the "law" of this is unknown. One has here a problem the statistical solution of which must depend upon increase of biological knowledge. As its practical importance, whether from a commercial or national point of view, is small, though its intellectual interest is great, no very striking progress can be expected.

JUNGLE YELLOW FEVER

In 1932 a new factor of interest and importance came into the epidemiology of yellow fever. Before then it was held that this disease was typically urban and that *Aëdes aegypti* was the only vector that need be taken into account, although since 1928 it had been known that other mosquitos, under experimental conditions, could transmit yellow fever by biting. Such transmissions were, however, thought to play no practical part in the natural spread of the disease. It was the outbreak of yellow fever in 1932 in the Valle do Chanaan in the State of Espirito Santo, Brazil, which first clearly demonstrated that some vector other than *Aëdes aegypti* is capable of spreading the disease. This outbreak of "rural yellow fever without *Aëdes aegypti*," and similar epidemics arising later in various parts of Brazil, Bolivia, and Colombia, commonly referred to as "jungle yellow fever," modified the opinion expressed by Carter,[1] that "owing to the invariable disappearance of yellow fever when this species [*Aëdes aegypti*]—and this species alone—is sufficiently controlled, it seems quite certain that in the Americas no other mosquito associated closely with man is vector." These outbreaks of jungle yellow fever presented certain special features. For example, infection appeared in or near to areas where clearing of the forest had been incomplete and was limited to those whose work took them into the fields or near the jungle. Thus the original outbreak was almost exclusively among male adults, and existing immunity in the same valley was likewise found to be limited almost entirely to the same population group; whereas in Brazilian towns, where transmission of infection was through *Aëdes aegypti*, immunity was more frequent and more uniformly distributed throughout all age-groups of both sexes. The demonstration of naturally acquired immunity in wild monkeys suggests the possibility of animal reservoirs from which man may derive his infection. But so far the origin and mode of transmission of jungle yellow fever have not been determined precisely: as Soper[2] wrote in 1936: "We have been forced to stand by and observe active jungle outbreaks during the past year with the same sense of futility which must have oppressed our predecessors in regard to urban yellow fever before the discovery of the transmission of yellow fever by the *Aëdes aegypti* mosquito." The experiments of Antunes and Whitman[3] with forest culicidae of the genus haemagogus are therefore of interest. These mosquitos attack man with avidity, on several occasions have been seen entering native houses near the edge of the forest, and have been captured feeding on the inhabitants; they have also been shown capable of becoming established in the towns. Because of these facts the authors carefully studied the capacity of this genus to transmit yellow fever. Unfortunately it was not possible to keep these mosquitos alive for long in captivity, and although it was clear from injection experiments that they could harbour the yellow fever virus, in only one of six attempts was it possible to transmit the virus by bite. Certain mosquitos require prolonged periods for the development of infectivity by biting, and it is not impossible this applies to some species of haemagogus; although they die prematurely in captivity, they may survive in the wild state long enough to be able to transmit the virus by biting. Whether this genus be implicated or not, the unravelling of the problems of jungle yellow fever will be of great scientific interest and practical importance.

[1] *Yellow Fever. An Epidemiological and Historical Study of its Place of Origin.* 1931. Williams and Wilkins Company, Baltimore.
[2] *Quart. Bull. Hlth. Org. L.o.N.*, 1936, **5**, 19.

TABULATION OF POST-MORTEM RESULTS

For some years now a method of tabulation of post-mortem results has been in progress in South Australia; these results have been published in the *Medical and Scientific Archives of the Adelaide Hospital*. This publication appears once a year and copies are forwarded to the various medical libraries throughout the world, so that the information contained therein is more or less accessible. The system adopted has been the following: At the end of each post-mortem examination a summary of the lesions is given, either in order of importance or in order of sequence. Trivialities are omitted. A number of copies of each summary are then typed and are pasted on cards corresponding to the lesions mentioned in the summary. If, for instance, gall-stones are present, or a duodenal ulcer, one copy of the summary will be pasted under each of these lesions. When a thousand necropsies have been tabulated in this way, the results are arranged in order and are then published in the *Archives of the Adelaide Hospital*. This work has been arranged by Professor J. B. Cleland, who is the honorary pathologist at the Adelaide Hospital. Most of the necropsies have been done by him, or if not actually done by him they have been carefully revised by him. The results are consequently uniform in type. What can be achieved under the supervision and direction of one person might not, however, be so successful in the hands of a number of different persons whose ideas might not quite agree. Three thousand post-mortem examinations have now been tabulated in this way, and a fourth thousand is nearing completion. Were similar results published from some of the hospitals in Great Britain, important information might be available as to the incidence of disease and the association between different lesions. For instance, in this way the association of cirrhosis of the liver with lenticular degeneration

[3] *Amer. J. trop. Med.*, 1937, **17**, 825.

might have been revealed if Kinnier Wilson had not already recognized this association. "Fibrosis of Lungs" has a heading to itself, apart from silicosis and organized pneumonic exudates. Seven cases, all in men, appear under this heading in the records of the third thousand necropsies and three of these each had one atrophied testis. Thus the finding of a shrunken testis in a patient with some obscure condition in the lungs would suggest the possibility of this being a diffuse fibrosis. The frequency of a syphilitic history in fibrosis of the testis is well known. The information thus published is available to anyone who is seeking data as to the prevalence of pathological lesions present at death, with the sexes and ages of such persons, and the association of other lesions.

PHENOMENON OF REFECTION

The puzzling phenomenon of refection was first described by Professor Fridericia in 1926: briefly, it is the ability, observed in a certain proportion of rats, to develop the capacity to grow normally on a vitamin-B-free diet. This acclimatization may last for a long while, so that affected rats can reproduce. But sooner or later it generally disappears and the rat dies with the usual symptoms of vitamin B deficiency. Refection is accompanied by the passage of pale bulky stools, and these have been shown to contain vitamin B_1. For some time the explanation given of the phenomenon was that conditions developed in the intestines of certain rats which enabled a micro-organism to flourish and synthesize vitamin B_1. It has been satisfactorily demonstrated that certain bacteria have the capacity to synthesize the vitamin, but the actual organism responsible for the phenomenon in rats has not been identified. Nathan,[1] working in the laboratory of Professor Fridericia at Copenhagen, believes that it is probably a Gram-negative vibrion. Refection was originally described in rats on a diet consisting largely of rice starch, but it has since been shown that potato starch is a better substrate. Nathan has demonstrated that faeces of "refected" rats contain a large percentage of undigested starch, and that the digestibility of this starch by the amylase of saliva is much decreased. He has also shown that although the refected rats have large quantities of starch in their stools, the actual amount of carbohydrate assimilated is no less than in the non-refected rats on the same diet. This eliminates one alternative interpretation which had been proposed—namely, that refected rats assimilated much less carbohydrate than non-refected rats, and that their requirement for vitamin B_1 was therefore much less. From these observations he concludes that the cause of refection is an amylodyspepsia resulting in an environment in the caecum favourable to the growth of bacteria which synthesize vitamin B_1 and therefore supply the animal with what is lacking in the diet. The favourable environment appears to be a high percentage of undigested starch. So far the interpretation appears to be satisfactory, but Harris[2] has recently described refection in rats on bread diets, and actually found that it occurred more easily on a bread diet than on a diet of the flour from which the bread was made. All previous observations had shown that refection did not happen if the starch in the diet had been cooked or heated. The last word has evidently not yet been said upon the subject. So far no clinical examples of refection have been described, and it would naturally be difficult to do so. Nathan points out that amylodyspepsia is not uncommon clinically, particularly in children.

[1] *Acta path. microbiol. scand.*, 1937, **14**, 383.
[2] *Biochem. J.*, 1937, **31**, 799.

CHRYSOTHERAPY IN PULMONARY TUBERCULOSIS

Little progress has been made in recent years in standardizing the details of administration of gold preparations in the treatment of pulmonary tuberculosis, or in determining their efficacy, because of the difficulty of obtaining reliable statistical evidence based on comparable groups of patients. In two papers just published, on evidence stated to be irrefutable, dogmatic claims are made that crisalbine has a favourable influence on the course of pulmonary tuberculosis; that it should be administered in small weekly doses—the maximum being 0.1 gramme—up to a total of 3 to 4 grammes over a period of seven to ten months; and that its administration should be stopped on the slightest evidence of intolerance. Courmont, Gardère, and Rivollier[1] gave crisalbine only to patients whose condition remained stationary after routine sanatorium treatment. Cases which were "hyperacute" or "too extensive" were thought to be unsuitable, as were those presenting the well-known contraindications—renal, hepatic, or intestinal disease. The patients were all males, and thirty-four of them (Group 1) received a complete course. The administration of gold was stopped in all patients who appeared to be getting worse and in those who developed any "accident" attributable to the gold. In twenty-nine patients (Group 2) this was necessary after 0.1 to 0.5 gramme of crisalbine had been given. In fifty-four other patients (constituting Group 3) there appeared to the authors to be "no clear indication" for gold therapy. They regard the second of these groups as statistically comparable with the first. The more important results in the three groups may be tabulated in percentages thus:

	Group 1	Group 2	Group 3
Disappearance of tubercle bacilli ..	44.44	7.69	8.33
Complete radiological clearing ..	25	8.33	5.55
Mortality in three years	23.52	48.27	42.59
"Immediate improvement" ..	63.33	50	52.27
Survivors { Improved	94.11	88.88	86.95
Survivors { Working	53	40	60.86

"Mild" symptoms attributable to the crisalbine occurred in 41.1 per cent. of the patients and included albuminuria six times, rashes or localized dermatitis eight times, diarrhoea six times, stomatitis twice, pronounced loss of weight five times, haematemesis once, and polycythaemia once. Since no patient developed nephritis,

[1] *J. Méd. Lyon*, 1937, **18**, 549.

hepatitis, purpura, or severe stomatitis or dermatitis, the authors conclude that small doses prevent serious complications. They believe that the slightest "accident" indicates an unfavourable prognosis and calls for immediate cessation of the administration of gold. In a second paper Courmont and Gardère[2] discuss at length, but unconvincingly, their experimental work on the action of gold and on the causation of symptoms during its therapeutic use.

FOULING OF THE ATMOSPHERE

The eighth annual report of the National Smoke Abatement Society records the removal of the Society's headquarters from Manchester to London, where offices have been secured at Chandos House, Buckingham Gate, Westminster. The claim is made that the smoke abatement movement has had a real effect in diminishing atmospheric pollution during the last twenty years. Reviewing a longer period, dating from 1881, it appears that since that time the percentage of winter sunshine in London compared with that at Kew has risen from 20 to 55. The report alludes with satisfaction to the increasing interest shown in this important question by Government departments, citing the Report of the Commissioner for the Special Areas, which stressed the desirability of using Welsh or other smokeless coal or fuel in open hearths. Inspectors of alkali works are now directly in touch with smoke abatement matters, and it has been arranged that they should advise the Minister of Health on developments. The total amount of subscriptions and donations to the society for the year under review is again only a little over a thousand pounds, an insignificant figure in view of the scope and importance of the Society's work. Medical practitioners in urban or industrial areas suffer more severely than most classes of the community from the incidence of fogs through the dislocation of their transport, the burden of a heavy increase in the number of cases of respiratory diseases on their visiting lists, and the greater risk to their own health. It is to their direct interest to support the society, for they will derive special benefit from the results of its activities.

The latest figures of atmospheric pollution show a tendency in the right direction, according to the twenty-third annual report on the investigation of atmospheric pollution, just issued by the Department of Scientific and Industrial Research (H.M. Stationery Office, 7s. 6d.). The report contains a warning, however, that while a definite improvement in the condition of our atmosphere may be beginning, no far-reaching conclusions should be drawn. Compared with the figures for the general average for the five years ended 1932, which is taken as a basis of comparison in this report, fewer observing stations than last year show a marked reduction in tar deposit. On the other hand fewer stations show an increase. There is an indication of improvement, however, in the deposits of fine particles of fuel escaping up the chimney and organic dust of various kinds. Ash deposits also show an improvement and there is a reduction in sulphate deposits. This latter is of importance in view of the damage caused by sulphur compounds to buildings and vegetation.

[2] *J. Méd. Lyon*, 1937, **18**, 559.

ARCHIVES OF DISEASE IN CHILDHOOD

The first issue of the *Archives of Disease in Childhood* for this year has just been published by the British Medical Association in a revised format. Like this *Journal*, it is now printed in Times New Roman type; the general result is pleasing to the eye, and the now familiar type face should encourage new readers to acquaint themselves with what is happening in the world of pediatrics. The editors of the journal are to be congratulated on producing a most interesting and stimulating number, and on the excellence of the illustrations. The first article is by Dr. George Graham and Dr. W. G. Oakley, on "The Treatment of Renal Rickets," in which they describe the results obtained in two cases by administering alkali and large doses of vitamins A and D, with considerable improvement. This is followed by articles by Dr. C. Wilfred Vining, on "A Case of Periarteritis Nodosa"; by Dr. Margaret Harper, on "Congenital Steatorrhoea due to Pancreatic Defect"; by Dr. Alan Moncrieff, on "The Administration of Thyroid Gland to Premature Babies"; by Dr. D. H. Paterson and Dr. C. Hardwick, on "Undulant Fever in Children"; by Dr. Theodore Crawford, on "A Standard Intravenous Glucose Tolerance Test"; and, to conclude, there are case reports on "Paraplegia and Mongolism in Twins," by Dr. R. G. Gordon and Dr. J. A. Fraser Roberts, and on "A Foreign Body in the Kidney," by Dr. Norman B. Capon.

THE HASTINGS LECTURE

The Sir Charles Hastings Lecture for 1938 will be delivered, under the auspices of the British Medical Association, by Dr. H. Crichton-Miller in the Great Hall of B.M.A. House, Tavistock Square, W.C., on Thursday, April 7, at 8 p.m. His subject is "Mental Health as a National Problem." The chair will be taken by Mr. Ernest Bevin, general secretary of the Transport and General Workers Union. Relevant questions, in writing, are invited at the close of the lecture. Admission is free by ticket obtainable from the secretary of the British Medical Association. The doors will open at 7.30 p.m. and seats not occupied by ticket holders by 7.50 p.m. will be available for others.

The *Canadian Medical Association Journal* for March gives preliminary information about the sixty-ninth Annual Meeting of the Canadian Medical Association, to be held at Halifax, June 20 to 24, conjointly with the Nova Scotia Medical Society. The presidential address will be given by Dr. T. H. Leggett of Ottawa, and the Osler Lecture on "Osler, the Last Phase, and His Influence on Medicine" by Sir Humphry Rolleston. Drs. M. R. MacCharles of Winnipeg and William Boyd of Toronto will conduct a surgical clinic on cancer, Dr. J. C. Meakins of Montreal a medical clinic, and there will be a symposium on poliomyelitis.

SURGICAL PROCEDURES IN GENERAL PRACTICE

This is one of a series of articles contributed by invitation

CONCUSSION AND COMPRESSION

BY

LAMBERT ROGERS, M.Sc., F.R.C.S., F.R.C.S.Ed., F.R.A.C.S., F.A.C.S.

In the article published last week at page 685 attention was directed to the damage caused by violence to the scalp and the skull; but while these lesions may in themselves be very important and have far-reaching consequences, stress must be laid upon the fact that one of the foremost considerations in all head injuries must be the condition of the brain itself. Our treatment must have as its object not only the preservation of the life of the patient but his protection from untoward after-effects of cerebral injury in the form of headaches, fits, impaired concentration, and other unpleasant sequelae. Increase in motor traffic has caused a corresponding increase in the number of head injuries, and the majority of these are of such a character that some damage to the brain is produced. It is important for us to visualize the nature of this damage, the way in which the brain reacts to it, and the processes involved in recovery when such takes place.

When confronted with a patient who has been rendered unconscious by a head injury we have to decide on three points: (1) whether he has merely been concussed or whether the brain has been extensively damaged; (2) whether surgical intervention is called for immediately or, if the condition is such as not to permit this at the moment, whether operation is likely to be required at a later stage; and (3) how we are to manage the case in order to prevent subsequent interference with cerebral function.

Cerebral Concussion

Professor Wilfred Trotter (1924) has defined concussion as "an essentially transient state due to head injury, which is of instantaneous onset, manifests widespread symptoms of a purely paralytic kind, does not as such comprise any evidence of structural cerebral injury, and is always followed by amnesia for the actual moment of the accident." Avoiding discussion relating to the nature of cerebral concussion, except to state that it is probably of vascular origin and in the nature of an acute and unsustained compressive anaemia, one need only say that this definition accurately describes the condition, which is of everyday occurrence, and that it is well supported by clinical experience. From the definition it will be apparent that the subject of a head injury who is unconscious for half an hour or longer is not suffering from concussion. In such cases we must postulate cerebral damage such as contusion or laceration. It also follows that the patient who can accurately relate the details of the accident and remembers the precise impact which caused his head injury has not been concussed, and the medico-legal significance of this will be obvious.

It would appear that there is a latent interval in the registration of cerebral impressions, and that a sudden interference with the registering mechanism, such as is conceivably produced by a severe head injury, cuts off impressions which have been streaming into the brain for some time beforehand. Thus the cyclist who is concussed may remember riding along a road and seeing a motor-car coming round a corner, and then all is cut off until he finds himself being attended to on the roadside. This period of amnesia appears to be a kindly provision on the part of Nature, since severe psychic shock might ensue if the precise details of the accident were to remain clear in the mind of the person who was injured. The period of amnesia, which is characteristic of both concussion and gross damage to the brain, must be regarded as a great saving factor.

Contusion and Laceration

The next group of cases we have to consider consists of those patients who, following a head injury, are unconscious for a variable interval; the unconsciousness may last for minutes, hours, or days, or it may even be of weeks' duration. In these cases there is gross cerebral damage, the brain being extensively bruised and possibly lacerated as well. Bleeding into the cerebrospinal fluid may be shown by its intimate admixture with blood when obtained by lumbar puncture. From the very first, also, there may be evidence of local damage to the brain in the form of focal signs such as a monoplegia, hemiplegia, or ophthalmoplegia.

It is important to examine the nervous system as soon after the accident as possible, because focal signs then present have been produced by primary injury of the brain. These signs have a different significance from those which appear later while the case is under treatment, when they may arise through compression of the brain by oedema or by blood-clot and may call for relief by decompression. There is much to be said for the American practice of having medical officers on ambulances, because, apart altogether from the importance of first-aid treatment, particularly in cases of haemorrhage and in spinal and other injuries, an early expert examination in a case of head injury is of value in determining the subsequent management of the case.

Surgical Intervention

Indications for Immediate Operation.—Compound fractures of the vault of the skull, like compound fractures elsewhere in the body, require urgent surgery to protect the patient from infection (see article in last week's issue). With this great exception very few cases of head injury require immediate operation. At this early stage operation is practically never required to deal with intracranial haemorrhage—not because haemorrhages do not occur in these early phases of head injury, but because, when they occur, they are rapid, widespread, are associated with extensive damage to the brain, and are so quickly fatal as to be beyond the art of surgery even if this be at once available.

Indications for Delayed Operation.—In simple depressed fractures elevation should be undertaken when the patient's condition permits, and only after adequate preparation. The indications for operation during the course of treatment are discussed later.

Management of Cases of Brain Injury

After examining the patient to ascertain whether there is a scalp wound, depressed fracture, or clinical evidence of a fracture of the base of the skull (see previous article), we should note whether there are any signs of focal damage to the brain such as facial or limb palsies or ophthalmo-

plegia. The significance of such signs at this stage has already been discussed. They must be regarded as the result of local damage produced by the injury, and constitute as it were the primary or basal clinical picture, for changes in which we must be on the alert.

The patient is put to bed in quiet and darkened surroundings, with the head elevated to reduce intracranial venous congestion, and fluids by the mouth are allowed in only very limited amounts or are withheld altogether. He is given six ounces of magnesium sulphate solution (30 per cent.) by the rectal route. The solution must be slowly and gently introduced, and its administration continued regularly at six-hourly intervals. The reason for this dehydration (by withholding fluids by the mouth and giving rectal magnesium sulphate) is gradually but persistently to reduce the quantity of cerebrospinal fluid within the skull and so give the bruised and torn brain space in which to expand as it reacts to the injury. The watery fluid is incompressible, and so only by its withdrawal or by the opening of the skull can the necessary room for this expansion be obtained. If the damaged brain is allowed to swell and expand the chances of its recovery are very much greater. We obtain evidence of this when we compare the reaction to injury shown by organs such as the kidney and the testis. If the kidney is bruised it swells (its capsule being readily distensible), and although there may be haematuria for a time the organ gradually returns to its normal size and function. The testis, on the other hand, is prevented from swelling because of the inelastic tunica albuginea, which in this sense resembles the cranium; and following a blow such as a kick there is subsequent shrinkage and withering up of the organ, the parenchyma of which undergoes a pressure atrophy because of the restraining and strangling influence of the inexpansile capsule. So it is with the brain: if we carry out persistent dehydration we both check the inevitable reactionary oedema and permit the injured brain to swell within the skull and make such a recovery of function that the patient is free from unpleasant after-effects. This dehydration treatment must be continued for at least ten days, and longer in severe cases (for example, in a case where the patient was unconscious for three weeks it was maintained for over a month), and may then be gradually replaced by giving, by the mouth each morning, doses of from one to four drachms of sodium sulphate while continuing to limit fluid intake.

Restlessness.—Traumatic delirium or cerebral irritation is sometimes a distressing feature of head injuries, and is probably the result of frontal polar contusion and widespread oedema. Since instituting routine dehydration, however, I have seen it less often and in a less intense form. The best drugs for the restlessness are the bromides, chloral and its allies such as chloralamide (20 grains, twice daily), and hyoscine (1/100 grain) given hypodermically. In most cases of brain injury morphine is better avoided because of its depressive effect upon respiration. The gently continued dehydration must be persevered with even if the restlessness of the patient makes it difficult.

Lumbar Puncture.—As a routine this is neither necessary nor advisable. It is occasionally useful in indicating the state of the intracranial pressure and in showing whether bleeding into the subarachnoid spaces has occurred. As a means of withdrawing fluid from the skull and reducing the intracranial tension it is too drastic, and the sudden pressure readjustments made upon the damaged brain are probably harmful. It should therefore not replace the gradual and continued dehydration treatment already advocated. As a means of ridding the cerebrospinal fluid pathways of blood which tends to set up reactions in the leptomeninges it may be practised with advantage every two to three days in those cases in which the cerebrospinal fluid is intimately mixed with blood. Not more than 15 c.cm. should be removed at a time, and this only slowly—that is, with the patient's head low, and through a needle of small bore.

Operation during Treatment Course

If dehydration has been steadily carried out reactionary oedema, should it occur at all, will be minimal in amount and in its effects, and if focal signs arise during the course of the dehydration treatment we must infer that these are due to clot compression—that is, a steadily accumulating intracranial haemorrhage. It is therefore very important to obtain a neurological clinical picture at the earliest possible moment, and, as previously pointed out, this forms a basal clinical pattern. A monoplegia which is present immediately after a head injury must be regarded as due to damage in the motor area of the cortex or along the course of the pyramidal fibres, caused by the initial tearing or bruising of the brain. On the other hand, a monoplegia arising during the course of dehydration treatment is due to accumulating haemorrhage and usually gradually increases in degree and extent, so that before long it becomes a hemiplegia. Such a focal sign of compression appearing in these circumstances is an indication for craniotomy, to evacuate the clot and relieve the pressure. These signs of local compression which arise subsequently to the primary injury have been aptly termed epiphenomena by Geoffrey Jefferson (1933).

Traumatic Intracranial Haemorrhage

Intracranial haemorrhage following head injury may occur either within or outside the meninges, and very occasionally takes place within the substance of the brain itself. The clinical features are those of focal or general compression of the brain—for example, the presence of paralytic phenomena (a monoplegia becoming a hemiplegia), slowing of the pulse rate, or the onset of stupor which may deepen into coma. Respiratory failure may occur, particularly if the haemorrhage is in the posterior fossa, and the heart may continue beating after respiration has ceased. In such circumstances artificial respiration and an emergency posterior fossa decompression are indicated (Rogers, 1933).

Operation in intracranial haemorrhage is done to relieve the brain of the ill-effects of the steady accumulation of blood-clot. When signs of compression appear craniotomy must not be delayed, and efforts to determine the site of the clot compression must be made. The site of compression is frequently revealed by the presence of contralateral weakness or paralysis of an arm or leg or of both limbs, or by a paralysed pupil on the same side as the clot. Progressive drowsiness in such cases is a warning that craniotomy is needed, because if the patient is allowed to sink into coma from clot compression the results of operation are not nearly so good as if this is performed when the patient is still conscious or merely drowsy. The classical signs of middle meningeal haemorrhage—namely, unconsciousness following a blow, a period of return of consciousness (the lucid interval), drowsiness and loss of consciousnes again—are by no means always present, but this form of intracranial haemorrhage will not be overlooked if, when managing the case along the lines here laid down, we are on the alert for signs of compression. We must be on the watch for epiphenomena.

Treatment of Intracranial Haemorrhage

Details of operative treatment are beyond the scope of this article. Blood-clot may be removed through burr or trephine openings or through an osteoplastic flap cut for the purpose. If burr openings are used several may be necessary, and small scoops for removing clot and a stream of hot saline are useful accessories.

Illustrative Cases

The following cases illustrate the application of the principles of treatment which have been considered.

Case 1.—A farm labourer aged 33 was admitted to hospital semiconscious and restless. In a brawl he had received a blow over the left temple from a part of a steel plough. While he was undergoing dehydration treatment cerebral irritation was a prominent feature. Three days after admission, while still semiconscious, he developed a right monoplegia, which soon progressed to a hemiplegia. Intracranial haemorrhage was diagnosed and a left osteoplastic craniotomy carried out. A large amount of extradural blood-clot (83 grammes) from a ruptured middle meningeal artery was removed and the bone-flap replaced. He made a complete recovery.

Case 2.—A schoolboy aged 12, when playing at school one morning, was struck over the left parietal bone by a small stone which had been thrown by another boy. He was only slightly dazed and did not lose consciousness. That night he had a headache, but was otherwise well. During the following week his parents noticed that he was becoming more and more drowsy, and five days after he had been struck he was semicomatose. He was seen by his doctor, who sent him to hospital. Craniotomy was performed at the site of the blow, and outside the dura mater a large mass of blood-clot from a torn middle meningeal artery was found and removed. He regained consciousness shortly afterwards and recovered completely.

Case 3.—A contractor aged 32 received a blow on the head during a fight. He walked to his home. The next morning he suffered from headache and vomited. A week later, because of persistent headache, he was sent to hospital by his doctor. A lumbar puncture revealed lemon-coloured cerebrospinal fluid, the pressure of which was normal. He was kept in bed and placed on dehydration treatment, but was inclined to be anxious and irritable. Fifteen days after his admission he became drowsy and developed left hemiplegia, and examination showed choking of both optic disks. During the day he steadily became more drowsy. Intracranial haemorrhage, probably subdural, was diagnosed, and operation was performed forthwith. The dura was tense and bluish, and when opened a large collection of old blood-clot was revealed. This was removed and the subdural space washed out with saline. He made a complete recovery.

Case 4.—A consulting physician aged 53, who had sustained a head injury in a motor accident, was admitted to hospital comatose and cyanosed, with stertorous breathing and a right monoplegia. He remained unconscious for three weeks. His cerebrospinal fluid was intimately mixed with blood, and a diagnosis was made of extensive cerebral contusion and laceration. *X*-ray examination showed a fracture through the squamous temporal bone of the right side running into the base. He was given the dehydration treatment to which reference has been made, and was kept quietly in bed. Although in consultation craniotomy was urged by colleagues because of the focal sign (monoplegia) it was not carried out, since it was concluded that as the sign had been present from the first it was caused by the primary contusion. He remained unconscious for three weeks, but made a complete recovery and is now back in consulting practice. There were no indications of an accumulating intracranial haemorrhage in this case. Dehydration was all that was necessary.

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INTERNATIONAL CONGRESS ON RHEUMATISM AND HYDROLOGY

OPENING OF OXFORD MEETING

The International Congress on Rheumatism and Hydrology was held at Oxford from March 28 to 30, and is being followed by the International Congress on Rheumatic Diseases at Bath from March 31 to April 3. The Oxford meeting, which was the fifteenth anniversary of the International Society of Medical Hydrology and the tenth of the International League against Rheumatism, was attended by about 200 representatives. Only one of the several delegates expected from Austria was present, and none from Czechoslovakia and other countries in Central Europe, and it was stated that an announced delegate from Soviet Russia was a political prisoner. But German and French were heard as frequently as English in the discussions. The first words uttered, indeed, were in German, when, at the ceremonial opening at the Sheldonian Theatre, Professor H. VOGT of Berlin proposed the election of Sir Farquhar Buzzard as President.

President's Address

Sir FARQUHAR BUZZARD devoted much of his brief address to describing the part played by Oxford men in promoting the study of hydrology. His first example was Dr. Walter Bailey of New College, Regius Professor of Medicine, who in 1587 described the medical properties of the springs of Worcestershire. After congratulating the editorial committee responsible for the volume entitled *A Survey of Chronic Rheumatic Diseases*, published in commemoration of the bicentenary of the Bath Royal National Hospital,[1] which, he said, was a challenge to the medical profession to spend yet more of its time and energy in attempting to overcome some of the most distressing and disabling scourges of all civilized races, Sir Farquhar Buzzard continued:

"The problem is one—and there are several others in medicine—in which the clinician, the pathologist, the bacteriologist, and the biochemist need all the help and information they can obtain from the student of preventive and industrial medicine, from the statistician, and from the social worker. Some help from all these sources is already available, but insufficient attempts have as yet been made to correlate the contributions and control the results with scientific accuracy. Is it too much to hope that sufficient money may be forthcoming from Government or other sources to establish centres for these studies where the social worker, the statistician, the clinician, and the pathologist may work together under the guidance of experts in preventive medicine and social hygiene?"

He also touched on the timely significance of the fact that experts were present from Germany, France, Belgium, and other countries, conferring in an atmosphere of entire friendliness, seeking only truth, and assured of good will and understanding. "Would that matters of far less importance than health could be discussed in a similar spirit."

Climate in the Causation of Disease

The first discussion, held at the University Museum, was on "Wet and dry climates and weather in the causation of disease." Dr. E. P. POULTON of Guy's Hospital, in an opening paper, said that he had found that to plot absolute humidity against temperature provided a measure of climate which was easier to assess than the more complicated "relative humidity." On this basis he had plotted average monthly values for humidity against temperature, and he showed curves for Calcutta and other places in India and for Kew and various meteorological stations in Great Britain. Each station had its characteristic curve, and could be classified into types according to geographical influences. A hot summer day in England

[1] Oxford University Press. Pp. 346, 31 illustrations. 18s.

was always humid. Mountain climates had low humidities and low temperatures. Complaint, said Dr. Poulton, was often made of the variable climate of the British Isles: the average monthly figures, however, showed a dull uniformity when compared with possibilities in other countries, but probably it was the day-to-day changes which counted for most in the feelings of the patient, and these were not shown by the average monthly figures.

While rainfall in this country had but a small effect on the average monthly figures for temperature and humidity it was only necessary to look at the daily weather report to see that a shower of rain had usually an immediate effect, almost completely saturating the air with moisture, or the high saturation might precede the shower. Although the lessening of evaporation by the skin, with perhaps added circulatory changes, would not be enough to produce general effects, it might quite well cause local disturbances in parts already inflamed, such as subcutaneous tissues, fasciae, and joints, which were well known in rheumatic patients to be sensitive indicators of damp associated with cold. But one of his patients had informed him that hot weather also caused pain, and that was not an unfamiliar experience.

During the last two years he had been struck by the possibility that dryness of climate was an agent against pulmonary tuberculosis. Open-air and mountain treatment of this disease might depend on atmospheric dryness. He pointed to the serious tuberculosis problem in India with its high humidities in all but certain of the hill stations. In the open-air treatment of phthisis in this country dryness of the air might perhaps be a factor. He had thus been led to try the effect of artificially dry air in the treatment of tuberculous patients. The patient lay in a bed tent kept at room temperature by ice. The Guy's model oxygen tent was used and supplied with air passed over silica gel. It was too early as yet to quote clinical results.

Effect of Variability of Climate

Professor GUNNAR EDSTRÖM of Lund, Sweden, followed with some interesting observations on the good and evil effects of a variable climate. Such a climate was trying to the organism, but it kept it in better trim and vigour. It created a heavy incidence of disease in many areas, but, on the other hand, it promoted longevity. In the United States the three regions marked by greatest variability of climate had the highest frequency of valvular disease of the heart, endocarditis, diabetes mellitus, and functional psychosis. On the other hand, in the same areas there were the greatest number of old people and the lowest number of mental defectives. In Europe the highest proportion of people above 80 years of age was to be found in Sweden, Norway, Eire, and the Faroe Islands, countries which had the most variable and biologically oppressive climate. The countries bordering the North Sea, with their variable climate, also exhibited, on the whole, the highest frequency of rheumatic diseases in Europe, and here valvular disease of the heart and endocarditis attained their greatest incidence. The speaker showed many charts illustrating the conditions in his own country of Sweden, and brought out the parallelism between the high percentage frequency of rheumatic fever among medical admissions to hospitals in districts where the climate was unstable and the high percentage frequency in these same districts of great longevity. No parallelism between these conditions and absolute or relative humidity of air, rainfall, or cloudiness could be discovered. A wet or dry climate, solely as such, had no significance with regard to the frequency of rheumatic fever; the feature of greatest importance was climatic lability, abundance of cyclones and anticyclones; it was the weather changes that produced the biological effects.

"Change of Weather" as an Exciting Cause

Professor DE RUDDER of Berlin also discussed the effect of alternations of cyclones and anticyclones as an exciting factor in various disorders. Where the relation between the weather conditions and the incidence of disease was not observable beyond all ambiguity, a true and not adventitious coincidence could often be established by the keeping of statistical records. He gave a table of the groups of disorders more or less clearly shown to be "meteorotropic" in character—that is, to be excited or worsened by what is commonly described as "change of weather," but which he called "lines of aerosol interface between weather systems or air masses of different kinds." He pointed out that many of the methods in use in physical medicine generally and in medical hydrology in particular were directed towards reducing this peculiar sensitivity.

An investigation into the muscular irritability of forty-three working people day by day over a period of six months, with special reference to change of weather, was described by Dr. ODON SCHULHOF of Budapest. He had estimated the reactions of these persons to small electrical current intensities, and showed the characteristic curves with fluctuations corresponding to warm and cold periods. Dr. TRAUNER of Belgrade gave a description of the incidence, varieties, and treatment of rheumatic conditions in Yugoslavia, with special reference to climate, and representatives of France and Belgium continued the discussion.

Juvenile Rheumatism

The subject of juvenile rheumatism was discussed, in successive sessions, from the pathological, clinical, therapeutic, and social aspects. In introducing the subject Dr. A. G. GIBSON of Oxford said that juvenile rheumatism in its typical features with carditis was only seen in the young; it was a disease of school age. The peak incidence was 7–10 years in London. It was associated with damp, was prevalent in some families, and in its incidence it followed acute infections, especially those due to the streptococcus. The primary streptococcal infection was most commonly in the upper respiratory tract. Many workers had shown the intimate relation of some form of streptococcus in cases of rheumatism to several different lesions, such as pericarditis, arthritis, and even chorea, but the large number of negative findings threw doubt on the observations. Treatment by streptococcal vaccines, protein shock, and intravenous flavine seemed to produce no great benefit, though anti-streptococcal serum had been used with good results. Professor F. KLINGE of Germany said that rheumatic fever (acute polyarthritis) in children, as in people of later years, was a generalized disease, but attacking principally the locomotor apparatus and the internal organs. A progressive form of rheumatic disease typical in the early years of life was visceral rheumatism, characterized by serious and widespread tissue damage to the internal organs without affecting the organs of locomotion. Its great medical importance derived from the fact that it brought about acute, subacute, and relapsing disorders of the heart and blood vessels.

Clinical Aspects of Rheumatic Infection

The clinical aspect was opened by Dr. LEONARD FINDLAY, who said that no definite statement could be made regarding the manifestations of rheumatic infection until the true cause was discovered and some specific test made available. Hence the search for the aetiological factor was a matter of primary importance in the further study of the disease which, in the first instance, it seemed wise to limit to those manifestations about which there was general agreement and probability of relationship. At present the only conditions which could be accepted as probable manifestations of rheumatic infection were, in order of importance, arthritis, carditis, chorea, the subcutaneous nodule, and erythema circinata; but not one of these conditions was pathognomonic of the disease and each of them could be, and was, with varying frequency, caused by some other infection. The diagnosis of the rheumatic infection depended on the combination and association of various manifestations.

Certain other manifestations from time to time ascribed to the rheumatic poison, such as inflammations of the pleura, meninges, peritoneum, and lungs, were, in Dr. Findlay's opinion, not justifiably to be considered as rheumatic in nature, but the ultimate decision must await the discovery of the cause and the development of some specific test. The subject was also opened by Dr. H. GRENET of Paris, whose paper covered almost the entire field, from aetiology to prognosis. Statistics of his own cases showed that 72 per cent. of rheumatic children had at some stage a heart lesion. This always occurred after either the first or the second attack, and in 65 per cent. the damage was permanent. He insisted on the gravity of the cardiac condition, and out of 184 cases recorded in the last ten years reported forty-four deaths. He admitted no analogy in kind between the slow malignant endocarditis and the progressive rheumatic carditis. The prognosis of juvenile rheumatism was, generally, unfavourable. Among all cases observed in hospital over ten years the total mortality was 17.39 per cent.

The discussion on juvenile rheumatism, which occupied two days and for which over thirty speakers were on the programme, will be more fully reported in the next issue. Between sessions the delegates managed to see something of Oxford and its environs, and the hospitality of the University was extended at a reception given by the Vice-Chancellor at the Ashmolean Museum on Tuesday evening. On the Saturday preceding the Congress the Royal College of Physicians of London gave an evening reception.

Nova et Vetera

WHAT DID BALZAC DIE OF?

J. G. E. Guérin has devoted his inaugural thesis (*Thèse de Paris*, 1938, No. 57) to an interesting inquiry as to the nature of the disease which carried off the great French novelist Honoré de Balzac at the relatively early age of 50. His father and mother died at 82 and 76 respectively, and he would therefore have seemed likely to enjoy a long life. There is no history of his having had any severe illness in childhood or early life, and his contemporaries described him as the picture of health and gaiety.

During his period of literary activity Balzac observed a special mode of life. He slept only five or six hours, ate very little, chiefly fruit, drank very strong coffee and a little Vouvray wine, and took a bath daily of an hour's duration. Although there is no doubt that he was overworked and took too much coffee, these factors are not sufficient to have caused his early death. After 1832, when Balzac was 33 years of age, his correspondence shows that he suffered frequently from headache and vertigo, and it was obvious that his principal symptom was hypertension. As regards the cause of this hypertension, although overwork, excess of coffee, and plethora in a subject inclined to obesity as Balzac was were important factors, they were not enough to give rise to severe hypertension in a relatively young and vigorous man. A few years before death he developed symptoms of dilatation of the aorta, which, in the absence of a history of infective endocarditis or acute rheumatism, can only be attributed to syphilis. The cerebral excitement associated with his prodigious literary activity and the arterial involvement were responsible for Balzac's premature death. The aortitis gave rise to hypertrophy of the heart, and the subsequent cardiac failure was accompanied by pulmonary symptoms such as dyspnoea and acute oedema of the lung, congestion of the liver, oedema of the lower limbs, and albuminuria.

Reports of Societies

PHYSICAL EDUCATION

At a meeting of the Section of Physical Medicine of the Royal Society of Medicine on March 18, with Dr. F. D. HOWITT in the chair, a discussion on physical education was opened by Viscount DAWSON OF PENN, the full text of whose address appears at page 734.

Physical Education in Europe

Professor B. A. MCSWINEY described a tour which he had undertaken, at the invitation of the Health Committee of the League of Nations, of certain European countries to ascertain if international co-operation would assist in the development of this subject. The countries visited included Denmark, Sweden, Holland, France, Italy, Austria, Czechoslovakia, Poland (one of the most interesting institutes of physical training was centred at Warsaw), and Germany. The outlook was widely different in many of these countries. In Denmark, for example, the object was to encourage uniform bodily development of the child; in Italy it was to reorganize the State on a new basis. In most European countries games at present did not form an important part of physical education. His opinion, and that of the colleagues who accompanied him, was that it would be difficult, perhaps almost impossible, to establish an international system; and, indeed, such a system might not be desirable, for the plans which produced excellent results for one type of population were not necessarily suitable for another type. In nearly all the Swedish schools, even the small country ones, a space had been set aside for gymnasiums. In most European countries—Germany was an exception—no special provision had been made for the physical education of boys and girls after leaving school or of adults or unemployed persons unless they were able to join private clubs. It was also observed that in most of the countries scant attention was paid to children who were below normal. Little knowledge seemed to be available as to the effects of physical exercise on the functions of the body. There was scarcely any co-operation between school medical officers and physical instructors. The latter in many of these European countries had too much responsibility, and there was a danger of physical education being regarded simply as a matter of school routine.

Physical Training in the Army

Major W. CAMPBELL, hygiene specialist of the Army Physical Training School at Aldershot, gave an account of that establishment. The appointment of the first whole-time officer at the school was made in 1922. It was realized that the construction of correctly balanced and progressive physical training tables required a knowledge of some of the main principles of anatomy and physiology, and that therefore the presence in the school of a specially trained medical officer would be of considerable value to the teaching staff. The functions of hygiene specialist corresponded closely to those of medical officer of health in civil life and embraced preventive medicine. He took a three-months course of physical training himself, which gave him the atmosphere of the school and taught him to sympathize with the men who were doing these things. In addition he did what really amounted to a postgraduate course in the physiology of muscular exercise. He was required in the school to be able to discuss questions arising out of physical training with men who, although they were not medically qualified, had undergone physical training for years and knew a good deal

of anatomy and physiology. No new exercise was introduced into the tables without a discussion between the medical officer and the teaching staff. Indeed, no exercise could be modified to any degree without such consultation.

The duties of the medical officer were generally the duties of a regimental medical officer, such advisory duties as he had indicated, the giving of instruction, the performance of routine observations and tests, and research. It was the policy of the school to base physical training on medically sound lines, and therefore considerable importance was attached to the teaching of elementary anatomy and physiology to the students. This knowledge placed the future instructor in a better position to teach his own subject, encourage the backward, and restrain those enthusiasts who would go too fast and too far. Lectures on anatomy and physiology were given by the medical officer. The various systems of the body were taught, with special emphasis on the correlation of the respiratory and cardiovascular systems. He gave an account of the routine tests and observations. The tests were designed not to assess the physical fitness—because it was assumed that these men were physically fit already—but to ensure that they were not unduly fatigued. Researches had been made on the grading of groups of exercises, the effect of smoking on endurance (it had been definitely shown that in the great majority of cases smoking militated against endurance, though there were exceptions), and on rhythmical breathing in accordance with the steps in walking.

Sir ARTHUR MACNALTY said that active steps had been taken to set up the national college of physical training. Without trained teachers and leaders the fullest use could not be made of opportunities provided, and one of the functions of the college would be to assist in supplying these teachers. It was also contemplated that the college would investigate some of the many outstanding problems connected with the physiology of this subject. In the mental and physical training of youth it was important that full use should be made of the services of preventive medicine, or zeal for either form of culture might outrun discretion. The Greek aim was a balanced rhythm. Socrates observed that runners often had overdeveloped legs and weak trunks, while boxers were too heavy in the upper part of the body.

Mr. PHILIP WILES commented that the audience had been dragged from Lord Dawson's eloquent description of life at its best to a description of how physical training was being abused in the Fascist countries, where men were trained with the declared objective of destroying their fellow human beings. The developments in Europe should place us on our guard in this country against a similar degradation here. The rapidity with which the Government scheme of physical training was introduced gave rise to certain doubts among the profession, but Lord Dawson had gone a long way to allay them. It was essential that physical training of some sort should come into being, but he did not think that any individual should be encouraged to participate unless there was evidence that he was getting enough to eat. In Moscow everybody who participated was required to be examined by a specially trained medical man in order to make sure that he was fit.

Sir ROBERT STANTON WOODS said that it was the inescapable duty of every medical man to afford help in this great effort to the utmost of his capacity and opportunity. He also warned against easy discouragement owing to the nature of early results.

Lord DAWSON said that he was all for studying nutrition side by side with physical training, but he hoped there would be no alarmist note on this subject. One had only to watch a gathering of elementary school children to be sure that on the whole they were very well fed. Malnutrition did exist, but only in patches; it was not universally spread.

PAINFUL FEET

At a meeting of the Hunterian Society on March 25 the subject under discussion was "Painful Feet." By way of introduction Dr. D. C. NORRIS, the President, drew attention to two beautifully recorded "case histories" many centuries old. One was the case of Asa (2 Chron. xvi), who was "diseased in his feet, yet in his disease he sought not to the Lord, but to the physicians. And Asa slept with his fathers." From the fact that the apothecaries brought into his bed sweet odours and divers kinds of spices, it seemed like a case of senile gangrene. The other was the case of Mephibosheth (2 Samuel ix), who "did eat continually at the King's table; and was lame on both his feet."

Evolutionary Causes

Mr. NORMAN LAKE said that the foot was a part of the body which was undergoing not evolutionary advancement but evolutionary regression. The feet of the ancestors of the human race must have been capable of a much wider range of movement, being designed to carry out many of the things which man did with his hands. The modern human foot had become a stereotyped structure, apparently restricted to the performance of one simple task. Not only were the feet of modern man encased, but in all civilized countries the ground was levelled so that in ordinary progression the foot was never called upon to carry out more than a narrow range of movement. The evolution of the modern foot could be traced to some extent in the various types of gorilla, where the great toe became more and more incorporated with the rest of the foot, instead of being, as it was originally, a separate and opposing structure, like the thumb of the hand. The incorporation of the great toe was, from the evolutionary point of view, a thing of yesterday, and anything of recent happening in evolution was likely to be unstable. As the great toe became incorporated so its size increased. In the chimpanzee it fell short of the length of the other toes; in human beings it commonly equalled the second toe. In the anthropoid apes the second and third metatarsal bones were fairly stout, capable of carrying the stress put upon them, while the first was relatively weak; but in man the length of the first metatarsal bone was increased considerably and the leverage axis of the foot had been altered, with consequent redistribution of pressures.

The solution to the problem of many cases of painful feet, which could not be pigeon-holed as hallux valgus, or ingrowing toe-nail, or hammer-toe, was to be sought in the fact that the foot was not yet entirely suited to the environment thrust upon it. The outlook from the point of view of treatment was not very promising. The aim should be to bring back some of the strain of locomotion on to the first metatarsal, relieving to some extent the second and third. But it was not easy to redistribute strains in the foot. A well-known plan was to fit a metatarsal pad immediately behind the head of the bone, raising it out of the position of strain, or, conversely, the shoe might be built up underneath the head of the first metatarsal. There was a tendency when confronted with a painful foot for which there was no obvious cause to blame the shoemaker. Mr. Lake was not prepared to incriminate the shoe, always excepting the high-heeled shoes of women. The real trouble in very many instances was an evolutionary misfit.

The Chiropodist's Methods

Mr. J. H. HANBY, Fellow of the Incorporated Society of Chiropodists, gave a demonstration of the way in which felt pads were applied for the equalization or relief of pressure and to bring into alignment such deviated structures as were sufficiently supple and amenable to be so treated. He pointed out that the application of felt to the foot in unskilled hands might do much harm. Great

skill was required in the shaping and tapering of the felt so as to avoid bruising. He showed in particular how the pad was applied to even out the pressure over the five metatarsal bones. He also touched upon the many painful conditions associated with the nails. A large number of thickened malformed nails could be reduced to almost normal by means of an electric nail drill, a painless procedure in the hands of a competent chiropodist and of great benefit to elderly patients by whom operation was not acceptable. Mr. Hanby concluded with some remarks on footwear. In his view socks and stockings, particularly in children, were a very important factor in the welfare or otherwise of the feet. He had examined 300 children at a school and had found 65 per cent. of them below the age of six to have signs of some toe trouble, in a large number the first stage of hallux valgus. It was not caused by the shoes, but in a large number of cases by ill-fitting hose. Women also often wore their stockings too short, for the reason that if the stockings were long enough they were usually too large around the ankle, but the consequence was foot trouble. He warmly supported the remarks in the letter by Dr. Margaret Emslie in the *Journal* of March 5 (p. 544).

Mr. C. LAMBRINUDI remarked that his hospital (Guy's) was the first to appoint a chiropodist to work in co-operation with the orthopaedic surgeon. He regarded the assistance of a chiropodist as being as important to the orthopaedic department as that of a masseuse. Indeed, they were complementary to each other. Mr. Lake had expounded the evolutionary cause of pain, but he did not suppose he regarded imperfect evolution as the sole cause. There were other causes of an acquired nature. In his own view the tips of the toes were every bit as important as the metatarsal heads. He entered into a discussion of the function of the toes in walking and the action of the flexor longus hallucis muscle.

Dr. J. B. COOK said that the question of the recognition of chiropodists had again recently received consideration by a committee of the British Medical Association (the Hospitals Committee) of which he was a member. Certain regulations had been drawn up restricting the domain of the chiropodist as a condition on which recognition could be given, but after witnessing Mr. Hanby's convincing demonstration that evening he felt that some of these regulations were ridiculous—for example, the one which required chiropodists to limit their activities to structures no deeper than the true skin. He for his part would do his utmost to further the interests of chiropodists in the future in this matter of recognition, and also to get a chiropodist appointed to his own hospital.

Other Causes of Painful Feet

Dr. FORESTIER mentioned some deeper troubles. He did not think that Morton's metatarsalgia was due to a mechanical fault; it had some cause connected with the circulation. In the hope of discovering the nervous stimulus involved in these obscure pains he had made local injections of lipiodol between the third and fourth metatarsal heads and sometimes between the fourth and fifth, and after these injections the trouble had cleared up in a quite remarkable manner. Another cause of pain in the foot was papillomas on the sole. He had found these yield to *x*-ray treatment.

Mr. S. L. HIGGS mentioned the condition of plantar warts. These very often appeared in a moist and soft skin, and might be due to some extent to abnormal pressures. It was rare to find a plantar wart on a dry hard skin. Plantar warts appeared quite commonly in young girls, especially the type of girl who was taking rather too much exercise. *X*-ray treatment was useful, but it was important to keep the skin dry and to apply some fungicidal preparation for a short time.

Mr. F. MCG. LOUGHNANE said that, after all, Mr. Hanby's treatment for the removal of pain was merely palliative. Unless the patient was within reach of the expert people who applied and renewed these pads his case was not permanently benefited, and the speaker thought it was for the orthopaedic surgeon to develop operations and exercises which would have a permanent curative value. If the fault was one of anatomy, surgery and physiology could always overcome it.

Mr. MORTIMER WOOLF said that his own feeling was that many of the painful feet which one saw were due to overmuch pressure on the first metatarsal bone, more especially when the first metatarsal was maintained in a position which was mechanically unfitted to support the pressure. When a child was born its foot was held in a position of varus, but from the moment it began to assume the erect attitude its nurse, mother, and teacher made it turn out its feet at an angle of about 45 degrees. This was a relic of military barbarism, dating from the time when armies, marching in close formation, were required to have the feet at that angle, otherwise the men kicked the heels of the row in front. When the feet were turned at that angle the whole weight of the body came on the sesamoid bones, which were apt to become displaced, and then the weight came on the head of the first metatarsal. On the other hand, athletes had the feet slightly inverted. Relief from foot strain could always be secured by turning the feet in.

Dr. P. B. SPURGIN and Dr. ERNEST YOUNG gave some personal experiences with special shapes of shoes which accommodated the natural contour of the foot. Dr. GERALD SLOT referred to certain hitherto unmentioned causes of pain in the foot, notably sciatica. Very often a sciatica was found in which the pain was referred entirely to the foot. Dr. J. G. JOHNSTONE (consulting orthopaedic surgeon, L.C.C.) said that he agreed with Mr. Lake's reference to congenital abnormalities, but he was surprised that so little had been said as to other causes of painful feet. Many acquired deformities were to be seen. The possibility of an infective focus also should not be disregarded. Mr. REGINALD HILTON referred to some work which had been done in Massachusetts upon the barefooted African negro from which it appeared—rather opposing Mr. Lake's contention—that few foot deformities were found among these people, thus suggesting that footwear was a common cause of foot pain in the shod European.

Dr. PHILIP ELLMAN, in proposing a vote of thanks to the speakers, said that he could add still other causes of painful feet. One not mentioned that evening was the occurrence of obesity, more particularly in women at the menopause, the foot pain being due probably to disturbance of the body equilibrium. Another interesting cause was unilateral Raynaud's disease, and still another gonococcal rheumatism.

INTRACRANIAL HAEMORRHAGE

At a pathological meeting of the Liverpool Medical Institution on March 10, with the president, Dr. E. GILBERT BARK, in the chair, Dr. A. J. MCCALL and Dr. T. W. WADSWORTH opened a discussion on intracranial haemorrhage.

Dr. McCall said that the principal mechanisms of cerebral haemorrhage could be summarized as: (1) rupture of an atheromatous artery without previous damage to the brain parenchyma; (2) rupture of a vessel passing through the site of an antecedent thrombosis; and (3) haemorrhage by diapedesis due to cerebral angiospasm. Cerebral haemorrhage was usually, but not invariably, fatal. Subarachnoid haemorrhage commonly followed the rupture of a "congenital aneurysm," and it was generally agreed that syphilis was rarely responsible. Syphilitic aneurysms, however, were occasionally encountered in the larger vessels, such as the basilar or vertebral arteries. In gummatous meningitis a diffuse oozing of blood might occur from the pial vessels, but was rarely sufficient to cause

a clinically evident subarachnoid haemorrhage. Dr. Wadsworth analysed cases of intracranial haemorrhage from the last 3,000 necropsies at Walton Hospital. In seventy-six adults a diagnosis of cerebral haemorrhage had been made before death; in forty-five of these cases the diagnosis was confirmed post mortem. There were eighty-eight cases of cerebral thrombosis (forty-eight females and forty males); there were twenty-eight cases of meningeal haemorrhage occurring in the first week of life or in still-born children.

Dr. ROBERT KEMP, discussing the aetiology of basal aneurysm, said that the average age at which this condition was seen was in the forties. Cerebral haemorrhage was commonest in the fifties, so that although the basal aneurysm was grafted on a congenital weakness, other factors in later life would seem to determine its growth or at any rate its rupture. It was noticeable, too, that bleeding sometimes took place when the patient was at rest, or often after the mild exertions of everyday routine. At other times an appreciable haemorrhage was preceded by several days of slow leaking—again suggesting that even though the sac might have been there for some time its actual rupture was determined by a transient and unexplained weakness of its wall. Dr. T. F. HEWER, who considered syphilis rarely if ever a cause of subarachnoid haemorrhage, referred to Turnbull's suggestion that although syphilis generally caused an obliterating periarteritis there was a possibility that a very acute syphilitic reaction might be haemorrhagic. He had examined the cerebrospinal fluid in many cases of severe acute syphilitic meningo-encephalitis, including some cases of neuro-recurrence after insufficient treatment with arsenicals in African natives, but there was never any indication of haemorrhage.

A PHILOSOPHER ON PSYCHOLOGY

At a meeting of the Medical Society of Individual Psychology on March 10, with Dr. H. C. SQUIRES in the chair, Professor JOHN MACMURRAY read a paper entitled, "A Philosopher's View of Modern Psychology."

Professor MacMurray began by saying that the function of the philosopher was to relate the field of the expert to the more general field in which it was included. Looking at medical science he noticed that the relation of doctor and patient, from which medical science and practice arose, was a particular type of relation between persons. It conditioned everything within the field of medicine and was itself conditioned by the nature of human relations in general. The patient was a person who was anxious about himself who asked another person to help him. The fact that the doctor–patient relation was a relation of persons provided certain principles in itself. Just as a teacher who taught his subject and not his pupils was a bad teacher, so a doctor who set out to heal diseases instead of people would not be a good doctor. The patient as a person requiring help was the focus of all problems in medicine. If medicine treated diseases, then a classification of diseases into bodily and mental would arise in which the unity of the person was lost sight of. Physicians and psychotherapists would have different objects to treat, and the necessity for co-operation in treating a patient who was always suffering in mind, whether or not he was suffering organically, would be lost sight of.

Every case which a doctor dealt with arose because of the patient's anxiety about himself. His anxiety which brought him to the doctor was his sense that something was the matter with him. The task of the physician was to discover what was the matter. If some mal-functioning of the organism could be discovered, then it could be correlated with the anxiety of the patient about himself. If this was correct, then the restoration of proper bodily functioning would remove this anxiety and bring the relation of doctor and patient to an end. But if the doctor could assure himself that there was no organic failure sufficient to account for the anxiety of the patient, what was to be done? The physician might feel inclined to say that there was nothing the matter with him. But there must be something the matter with a man who came to a doctor when there was nothing the matter with him. The anxiety must have a cause. As it was an anxiety about himself the cause must lie in himself. If it had no observable bodily correlate the anxiety itself was a disease, and expressed the patient's sense that something was the matter with his functioning as a human being. The task of finding what was the matter and curing it was then the task of the psychotherapist.

Professor MacMurray devoted the rest of his address to a determination of some of the general characteristics of fear as exhibited in human behaviour. He emphasized the need for distinguishing fear and its derivatives as negative motives with an inhibitory effect from the positive motives which determined the positive life processes. He distinguished human fear from "animal" fear by the presence of anticipatory fantasy. He pointed out that in all the development of consciousness, and especially in all rational reflection, fear was always present. Reflection itself involved the inhibition of action. In action fear expressed itself as caution, the recognition of the possibility of mistaken behaviour, and so in the distinction between right and wrong. Thus it was a mistake to maintain that fear was neurotic in itself. Nevertheless, anxiety as a pervasive fear which determined an egocentric and self-defensive attitude to life was an expression of human mal-functioning. The rhythm of human life involved both fear to provide the motive for withdrawal into reflection and the triumph over fear to provide the return to positive activity enriched by reflection. This general diagnosis of human mal-functioning, he added, could not be complete without reference to love in relation to fear, because of the inherent mutuality or reciprocity between persons which was the characteristic feature of human life. The environment for any person was primarily other persons. For this reason love negated by fear was the all but universal source of neurosis.

Professor MacMurray concluded by saying that these general considerations of the wider situation which conditioned psychological medicine suggested to him that he would expect that in psychotherapeutic practice the nature of the relation established between doctor and patient would play a major part in success or failure; and also that the truth of the psychological theory held by the doctor would prove of less importance in the achievement of a cure than might at first sight be expected.

PROPHYLAXIS OF INFLUENZA

At a meeting of the Pathological Society of Manchester on March 9, with the president, Professor DANIEL DOUGAL, in the chair, Dr. WILSON SMITH read a paper on the search for an influenza prophylactic.

Dr. Smith said that a virus was first isolated in 1933 by the intranasal inoculation of ferrets with throat washings obtained from cases of influenza; since then many strains had been isolated by a similar technique all over the world. The ferret disease closely resembled human influenza in its symptomatology and the ease with which it was transmitted by contact. The entry of the virus into the respiratory tract was, however, necessary for infection; virus inoculated by other routes was innocuous. A lung-adapted strain of virus obtained by serial passage under anaesthesia caused a much more severe illness accompanied by pulmonary consolidation. Ferrets which had recovered from influenza were completely immune to reinfection for a few months; then the immunity waned slowly, so that for some time experimental inoculation of the virus was followed by a mild disease of short duration without any lung involvement. The resistant state was characterized by the presence of virus-neutralizing antibodies in the blood.

The virus was later adapted to mice, in which animals it produced a virus pneumonia. By grading the dose of mouse-adapted virus it was possible to obtain all degrees of lung involvement from small root lesions to complete consolidation of all lobes. Other ways of propagating the virus were by growth on the chorio-allantoic membrane of the developing chick embryo, and by growth in a medium consisting of minced chick embryo and Tyrode's solution. Ferrets, mice, and eggs had all been used in the search for a prophylactic. The tests employed to gauge the effect of vaccination upon resistance fell into two main groups—tests in which the animal was exposed to infection, and tests designed to measure the antibody level of the animal's serum. Antibodies might be measured by virus neutralization tests in ferrets, mice, and eggs, or by the *in vitro* complement-fixation reaction. Unfortunately the results obtained by these different tests showed puzzling discrepancies with some sera, and it was not yet known which test gave the truest measure of active immunity.

Virus Vaccines

Vaccination of normal ferrets conferred a degree of resistance sufficient to protect against contact infection, but insufficient to protect completely against large doses of virus inoculated intranasally. The induced partial immunity, however, saved the lungs from involvement when the lung-adapted strain of virus was used for the immunity test. Vaccination of ferrets which possessed some residual immunity as a legacy from a past attack of influenza restored the solid immunity which they enjoyed immediately after recovery. Vaccination of mice resulted in the complete protection of a high proportion of animals, a reduction of mortality rate, and a decrease of the extent of lung involvement in those not completely protected. Experiments with mice had been particularly useful for comparing the efficacies of different vaccines with a view to obtaining the most suitable product for use in man.

Prophylactic experiments in human volunteers had been carried out in England with killed virus vaccines, and in America with living virus inoculated by non-infective routes. Vaccination, in all the experiments recorded, resulted in a striking increase of serum antibodies. In America the reduction of the incidence of febrile respiratory disease in vaccinated groups as compared with control groups during subsequent epidemics augured well for the possibility of controlling epidemic influenza in the future. In England an epidemic broke out too soon after vaccination for the results to be of much value. The problem of efficient prophylaxis was complicated by the fact that antigenically different virus strains existed. The differences could be demonstrated either by cross-neutralization tests with virus strains and their homologous antisera, or by cross-vaccination experiments in mice. Such experiments showed, however, that different strains possessed some antigenic components in common. It was hoped that an efficient prophylactic might be obtained eventually by the inclusion of several strains.

At a meeting of the Midland Mental Pathological Society, held in the Anatomy Department of the University of Birmingham on March 24, Mr. W. GREY WALTER (Research Fellow at the Central Pathological Laboratory of the London County Mental Hospitals) gave a lecture on the electro-pathology of the brain. He described in detail the apparatus employed and discussed the findings with the aid of a considerable number of illustrations. He also gave a practical demonstration on a case in which rhythmic disturbances characteristic of epilepsy were well shown. The lecturer's able exposition made the simplicity of the apparatus and the ease of its application a pleasant surprise to the members, and the discussion which followed showed the interest that had been taken and the possible practical usefulness of the apparatus in mental hospitals.

Local News

SCOTLAND

Population of Scotland

An address dealing with the maintenance of population was given by Mr. J. G. Kyd, Registrar-General for Scotland, at a meeting of the Edinburgh City Business Club on March 8. He said that the rate of increase had been diminishing steadily during the last seven years, although the population of Scotland was not yet decreasing. There was a probability that the number of deaths would go up owing to the gradual ageing of the population, notwithstanding that there might be an actual improvement in the mortality age by age. Overseas emigration on a large scale had ceased, although the drift of people southwards across the border had shown an increase during the last eight years. The average yearly loss by emigration in the first thirty years of the century was much greater than the yearly loss by death among Scottish soldiers in the war, and the total loss in these thirty years had been more than ten times as great as the number of Scottish soldiers who died in the war. The birth rate for Scotland was higher than that for England, and the fertility of Scottish women was about one-third greater than among English women. The death rate in Scotland was, however, slightly higher than it was in England, but the rate of natural increase—that is, the difference between birth rate and death rate—was about 50 per cent. higher in Scotland than in England. England, however, gained by immigration, while there was a loss to Scotland from emigration.

Scottish Chiropodists

At the recent annual dinner in Glasgow of the Scottish Branches of the Incorporated Society of Chiropodists Mr. John Bruce said he was glad to have an opportunity of paying a surgeon's tribute to the contribution that chiropody was making to the health and well-being of the community. This was not an absurd cult or fad of fashion, but was an application of skill with knowledge to one of the most disturbing of human ailments. Recognition of this work had been tardy, but chiropodists enjoyed the confidence of those medical men with whom they had come in contact. It was an impressive fact that last year 50,000 people received help from the various institutions controlled by the Incorporated Society's Scottish branches. Edinburgh had provided the greatest number with 20,000, but even these figures represented merely the fringe of the problem which faced chiropodists. In the not far distant future inspection of school children and adolescents entering factories would probably be a routine part of industrial supervision, and the prospects of chiropody as a career would be increased.

Child Welfare

Speaking at a meeting of the Edinburgh Women Citizens' Association, Professor Charles McNeil, of the chair of child life and health at Edinburgh University, said that in the last twenty-five years the death rate in Scotland during the first year of life had fallen from 100 to 82 per 1,000 births, but in England the rate was only 69 and in New Zealand 31. To reduce the Scottish figure it would be necessary to improve the machinery for protection of child life, chiefly by improving the existing social arrangements for maintenance of health. It would be well to entrust the trained health nurse with more responsibility and to give her better training as had been done in New Zealand. The guardian of the young

child was the mother, and if she was given the necessary knowledge much could be done to preserve child life. Many years ago an institute had been established in Paris where child ailments were studied and mothers instructed how to deal with them, and this had resulted in a substantial reduction in the death rate of infants. Twenty years ago in Edinburgh a similar idea had been advocated by Sir Leslie Mackenzie, and the speaker would like to revive this, because in the new maternity hospital which was being built there was a centre where students and maternity nurses could be trained in the treatment of young children. This could be made a centre of national education for the training of health nurses.

IRELAND

Ulster Medical Society Annual Dinner

The recent annual dinner of the Ulster Medical Society, which was held in the Whitla Medical Institute, Belfast, was memorable for the presentation to the Society of two magnificent portraits, one of Sir William Whitla painted by Mr. F. McKelvey, and the other of Sir Hans Sloane, painted by Mr. Clifford Hall. These were the generous gift of the president, Professor W. W. D. Thomson, who presided at the dinner. Sir Thomas Houston unveiled the portrait of Sir William Whitla, and Sir Humphry Rolleston that of Sir Hans Sloane. It is particularly appropriate that a portrait of Sir William should occupy a place in the Institute which bears his name, and which was his gift to the profession of Ulster during his lifetime. The Society is proud of the possession of these gifts, and they can be assured of a permanent place in its collection. The dinner was also the occasion of the presentation of Honorary Fellowships of the Society to Sir Humphry Rolleston, Sir Robert Johnstone, President of the British Medical Association, and Colonel A. B. Mitchell. The scrolls of the Fellowship, hand-painted and bound in morocco leather, were handed over by the president, who referred in felicitous terms to the outstanding services each recipient had rendered to medicine. Sir Robert Johnstone's Fellowship was conferred *in absentia*, the scroll being given to him at a subsequent meeting of the Society. The toast of the new Honorary Fellows was proposed in very happy terms by Dr. Robert Marshall, and was responded to by Sir Humphry Rolleston. Professor P. T. Crymble proposed the toast of the guests, and this was responded to by the Right Hon. J. H. Robb and Professor W. B. Morton.

The Belfast Hospital for Sick Children

The annual report of this hospital refers to the loss sustained in the death of Dr. Malcolm B. Smyth, a son of one of its joint founders. Reference is also made to the Clark benefaction, whereby the hospital receives the sum of £15,000 for the erection and equipment of a block to be used for paying patients. Plans for this extension are at present being considered, and there seems to be no doubt that this will prove a welcome addition to the services this hospital renders to the public of Northern Ireland. The total expenditure for the year amounted to over £8,900, there being a deficit on the year's working of almost £1,000 which had to be met from capital. That the hospital continues to extend its usefulness is shown by the figures in the medical report of 61,582 attendances in the extern department, 1,468 admissions to the intern department, and a total of 2,500 operations. The extent to which ancillary services are used is indicated by the fact that 2,447 patients were examined in the *x*-ray department. The hospital is also an important teaching centre, the number of students attending for practical instruction having been ninety-four.

Correspondence

Classification of Adventitious Sounds

SIR,—I am glad Dr. W. C. D. Walmsley (March 26, p. 702) has drawn attention to the need for simplification and more uniformity in the nomenclature of pulmonary adventitious sounds. I was taught by the late Professor Wyllie, than whom I have known no better teacher of physical signs, that all these adventitious sounds fell under one of three heads: (1) dry sounds, (2) moist sounds, (3) friction sounds; that dry sounds (rhonchi) were either high or low in pitch, depending upon the size of the tube in which they arose; that moist sounds were either fine (crepitations), medium, or coarse, again depending upon their site of origin, and that friction sounds were either fine or coarse.

I still believe this classification to be adequate for all practical purposes, and I should have liked to use it in the book on *Clinical Methods* to which Dr. Walmsley refers, but found that so many teachers were using much more elaborate classifications that some compromise was necessary. Perhaps I should have had more of the courage of my convictions.—I am, etc.,

London, W.1, March 28. ROBERT HUTCHISON.

Familial Clubbing of Fingers and Toes

SIR,—Readers of Dr. D. R. Seaton's instructive article on the above subject in this week's issue of the *British Medical Journal* would, I am sure, be interested to learn from Dr. Seaton himself, or any other of your correspondents, what he or they believe to be the exact Mendelian dominant which is inherited in these cases. It surely cannot be the clubbing itself, but rather some functional circulatory defect which for mechanical reasons determines the vascular congestion of the extremities, on which the clubbing probably depends. I raised this question on page 606 in my recently published book, *The Infant*, in a passage which I may perhaps be allowed to quote in the hope that it may stimulate one of your readers to put the explanation of the pathogenesis of this anomalous condition therein suggested to the practical and easy test of a few blood volume estimations. The quotation reads as follows:

"Whatever may be the cause of this condition [clubbing of the fingers] it must be one which will explain its occurrence in both pulmonary and circulatory disabilities, as well as in septic conditions. Most of the explanations which have so far been given do not appear to fulfil these conditions. There is reason to doubt that it is due to the effect of toxins acting on the soft tissues of the finger ends—a view commonly held—or that it is due to the mechanical effects of cardiac insufficiency. Dr. Jean Smith has made the ingenious suggestion, which is supported by some independent evidence, that clubbing, especially in cases of congenital heart disease, is caused by an excessive volume of blood in the body, a condition which may well cause a vascular congestion in terminal parts which are not well supported, and when the local circulation is carried on under disadvantageous circumstances."

In cases of familial clubbing it may be that for some reason not at present understood there is an inherited tendency for a plethora of blood to be maintained in the circulation.—I am, etc.,

London, W.1, March 19. ERIC PRITCHARD.

Use and Abuse of Antiseptics

SIR,—Mr. A. C. F. Halford's reference (*Journal*, March 26, p. 702) to my recommendation of biniodide in spirit as a means of sterilizing the hands, in my introductory article to the "Surgery in General Practice" series, has aroused in me a sense of guilt, not at having made the recommendation but for failing to vindicate it when in the following article (December 18, 1937) Professor L. P. Garrod and Mr. G. L. Keynes condemned it in no uncertain way. I was very tempted to reply at the time, but as the articles in question were both in the same series a feeling of propriety, possibly combined with that of good will appropriate to the season then at hand, withheld me. This series of articles is designed to provide the practitioner with simple practical instruction on the conduct of minor surgical procedures, so that abstruse discussions as to the laboratory characteristics of antiseptics are rather out of place. It is a fact that hundreds of thousands of operations, some of the most delicate nature from the point of view of infection (arthrotomies, bone grafts, etc.), have been performed with very successful results when the skin was "sterilized" with the solution I recommended.

The word "sterilized" is placed in inverted commas advisedly, for everyone knows that absolute sterilization of the skin is impossible even with the most modern antiseptics. It is a relative question which does not arise when dealing with instruments, catgut, etc., and practical experience shows that such antiseptics prove to be very satisfactory. The controlled experiments of the laboratory fail by reason of the very control which is so often extolled. The only legitimate interest which surgery can possibly have in antiseptics is in their behaviour when applied to the "uncontrolled" human tissues, and here experience will be the only guide. One example of this—and probably an important one from the practical point of view—is the fact that laboratory experiments almost always ignore any detergent effect which an antiseptic may have. This I conceive to be a more valuable effect than that of killing organisms when the skin is under consideration. Wiping over with a fat solvent such as ether abolishes more organisms than the application of the most efficient antiseptic. But there are other very valuable properties which some substances possess (spirit among them), giving them a kind of physical, as opposed to chemical, bacteriostatic effect, to which again the laboratory worker apparently pays little heed.

In a letter I cannot enter further into these effects, but their mention will be sufficient to indicate to those searching for the truth that we cannot yet afford to ignore the results of practical experience in favour of the more theoretical knowledge the laboratory provides. There was a time, not long ago, when a standard laboratory coefficient was regarded as a good indication of the efficiency of an antiseptic in surgery; the modern laboratory worker knows better and takes many other factors into consideration before he expresses an opinion; but even so it is my contention that there are still many more factors which he ignores, particularly on the physical side of the problem.

While this is so I prefer to be guided by clinical experience, despite the criticism that clinical observations are but pseudo-scientific. To my mind science is a far greater thing than the mere conduct of experiments in laboratories.—I am, etc.,

London, W.1, March 27. NORMAN C. LAKE.

Safe Milk and Safe Butter

SIR,—Dr. Emyr Jones's letter in the *Journal* of March 19 (p. 648) is a useful reminder that tubercle bacilli may be found in milk products as well as in raw milk. In appealing to the public, however, we must keep things in perspective. While it is true that farm butter prepared from milk which is not pasteurized may contain tubercle bacilli, the point is not very important from the national aspect, since it would appear that 80 to 90 per cent. of the butter consumed in this country is imported and that most of it is made from pasteurized cream. Pullinger, writing in the *Lancet* of June 8, 1935, records the result of examinations of cream, butter, and cheese. Of thirty-one samples of raw cream sixteen contained tubercle bacilli and eleven *Br. abortus*, whereas thirty-five samples of pasteurized cream were free from both contaminants. He examined thirty-nine samples of butter, of which twenty came from factories, ten from farmhouses, and nine were definitely identified as imported. Neither the tubercle bacillus nor *Br. abortus* was found in any of these. Samples of cheese to the number of sixty-three were examined; thirty-four of these were soft cheese in the fresh state or two days old, but rather surprisingly none of them contained tubercle bacilli or *Br. abortus*. Among twenty-nine samples of hard cheese seven days old or more only four, which were seven days old, contained tubercle bacilli, and of these three also contained *Br. abortus*. He points out that autosterilization occurs during the ripening period, and one would therefore expect to find contaminants more frequently in soft cheese.

The following passage, therefore, from the League of Nations Report on the Milk Problem, contained in the *Bulletin of the Health Organization* for June, 1937, appears to be justified:

"In this connexion we may point out that neither butter nor cheese appears to be of any considerable importance in the causation of tuberculosis or undulant fever. Except on farms, butter is almost invariably made from pasteurized cream, while in hard cheese both the tubercle bacillus and *Br. abortus* are usually dead some considerable time before the ripening process is complete. Only in farm-made butter and in soft cheese are these organisms likely to be found alive. The vast majority of milk-borne tuberculosis and undulant fever is undoubtedly due to the consumption of raw milk or cream."

In these circumstances, while in areas where much farm butter is consumed there may be a case for urging the public to consume butter prepared from pasteurized milk, so far as the whole country is concerned the problem is a small one compared with that of milk used as a beverage in the raw state.—I am, etc.,

Cardiff, March 23. RALPH M. F. PICKEN.

Pasteurization of Milk

SIR,—Dr. Halliday Sutherland's reference (March 26, p. 704) to the report of the Economic Advisory Council's Committee on Cattle Diseases is so limited as to be misleading, at least to those who have not read the report itself. It is true the report recognizes that pasteurization produces in milk some deficiency in vitamins C and D. It adds, however, certain qualifying propositions. Thus on page 37 the committee writes that "it is perhaps only in relation with infant feeding" that these changes "can possess significance. Older children seldom depend on milk alone for their supply of the vitamins C and D, and the benefit of a milk ration when added to the average diets consumed, say, by children in institutions . . .

would seem to be exerted by pasteurized no less than by raw milk." And again (p. 57) "innumerable healthy children are to-day reared on a diet containing no unpasteurized milk."

Dealing in particular with infants fed entirely on milk, the committee states that any vitamin deficiency can be easily corrected by the addition of certain fruit juices, and adds that such addition "is almost as necessary in the case of raw milk, with its variable vitamin content, as in that of pasteurized" (p. 38); while the general conclusion of the committee reads "that any recognizable changes of quality induced in milk by pasteurization rightly conducted are as a whole too small to outweigh the great advantages inherent in the protection from infection which the treatment secures and in the public confidence which it inspires" (p. 38). No one who reads the report can doubt the committee's conviction of the risks attached to the consumption of raw milk and its endorsement of the protective value of pasteurization.

Dr. Sutherland's bacteriological inquiries are not within my personal range, but he will no doubt have noted with interest that a recent elaborate series of comparative and controlled experiments on calves conducted under typical commercial conditions led *inter alia* to the conclusion that "the work failed to show any significant difference in the nutritive value of raw and pasteurized milk," while "the use of pasteurized milk, however, had a clear advantage in that it preserved the animals from infection through drinking milk containing living tubercle bacilli." (J. Wilkie and others: *Journal of Dairy Research*, Vol. viii, No. 3, October, 1937).—I am, etc.,

London, W.1, March 28. C. O. HAWTHORNE.

SIR,—I desire to correct any erroneous impression I may inadvertently have conveyed to Dr. Halliday Sutherland's or anyone else's mind regarding manurial *B. coli* in milk. Before milk is pasteurized it is invariably examined bacteriologically, at any rate so far as the company with which I am connected is concerned. It is in this raw milk, subsequently pasteurized, that manurial *B. coli* is so seldom found, the bulk of the *B. coli* found being of non-faecal type. If Dr. Sutherland had read the whole of my letter carefully he would have seen that I assert that "milk that has been pasteurized is entirely free from potential pathogenic germs"; naturally this includes *B. coli* of all types. How can a process that ensures germ-free milk give anyone a sense of false security in face of the fact that unpasteurized milk cannot be said to be free from pathogenic germs of a deadly type? Surely such an assertion of false security is straining at the gnat and swallowing the camel. In the *Journal of Dairy Research*, Vol. viii, No. 3, 1937, this idea of a false security is entirely negatived. The passage was quoted in full by Dr. Bernard Myers in his letter published in your issue of March 5, 1938, p. 537.

These are not mythical ideas, they are proven facts, the result of intensive research by men of high standing searching keenly after the truth, and should convince anyone capable of logical deduction that the only safe milk we have at present at our disposal for human consumption must be pasteurized. We hear a lot about the terrible results of the destruction of vitamins by pasteurization, mostly exaggerated, but what is the ratio of value to human life between a slight deterioration (if any) of the nutrient quality of milk by pasteurization—a deterioration easily replaced—and the presence of death-dealing germs that cannot be removed from raw milk except by pasteurization? That is the question that advocates of raw milk must answer satisfactorily or they must give up the fight.—I am, etc.,

Streatham, March, 1938. JAMES KIRKLAND, M.B.

SIR,—Dr. Halliday Sutherland mentions an outbreak of typhoid in Montreal which was traced to a typhoid carrier working in a pasteurizing plant. In this country we have many more carriers of tuberculosis than of typhoid. Here are two instances which suggest that few, if any, precautions are being taken to avoid contamination of our milk supplies by such carriers of tuberculosis.

(1) Some months ago a man suffering from advanced phthisis was admitted to a sanatorium in Fife. When asked his occupation he replied, "I am the dairyman in charge of a T.T. herd of cows." Such a carrier could easily infect the cows as well as their milk.

(2) A few weeks ago I operated on a young dairymaid for tuberculous cervical glands. For six weeks before operation she had had a discharging sinus in the neck. Incidentally, no notification as to her condition had been sent to the public health authorities.

Veterinary inspection of dairy cows alone is not enough. Until the dairy workers also are periodically inspected and "vetted" can we regard any milk as safe unless effectively pasteurized?—I am, etc.,

Dundee, March 27. F. R. BROWN.

SIR,—Having great respect for Dr. H. Sutherland's experience and attainments I was surprised to read his letter in the *Journal* of March 26. Surely pasteurization cannot be held to remove the stimulus towards the production of clean milk when so many pasteurizing concerns have found, often through bitter experience, the necessity for a clean milk to start with, as the heat-resisting bacteria so often present in unclean milk may not only prevent the finished product from reaching the necessary standard but may also foul the plant in such a way as to interfere seriously with work for some time.

Of course, milk can be contaminated after it has been pasteurized as, I believe, was the case in the Montreal typhoid epidemic, but surely this possibility, which plant managers should always have in mind, would hardly have been a suitable part of the now famous advertisement? It amounts to this: necessity for care in handling milk is not removed by pasteurization; but I do not think this was expected of it. Also, there are more reasons for the attempts to eliminate tuberculosis among cattle other than that of producing T.T. milk. Once farmers realize the possibility of preventing disease, I do not suppose they will tolerate its ravages, quite apart from its effects on milk.

By all means consider the effects on the fertility vitamins of milk, but let us also think of the toll bovine tuberculosis takes of infants and potential mothers. If we have to choose, which represents the greater menace towards the maintenance of the population level? In these days, when even bad causes can muster united fronts, let there be no dissension in the ranks of those striving to prevent this other slaughter of the innocents. In this campaign the B.M.A. should represent not only its 37,000 members but also every worker who has ever given a thought to the subject.—I am, etc.,

London, W.C.1, March 29. EMANUEL AGIUS.

Cancer of the Lung

SIR,—With reference to the recent annotation (*Journal*, March 26, p. 682) on this subject, some further information may be of interest. In some respects it is possible to bring the Joachimstal (and presumably Schneeberg) miners' lung cancers into line with those observed in metal grinders and in the mice exposed to road dust. In all cases, besides silica in some form, iron is present in the dust. Some of the inorganic contents of the Joachimstal dust resemble very closely those of the road dust, which produce lung cancer in mice (see Table). The presence of some form of iron and silica in these dusts is suggestive, and further experimental work is in hand dealing with this aspect of the problem.

Some Inorganic Constituents of Dust

	Road Dust	Metal Grinders' Dust	Joachimstal Pitchblende Dust	Nickel Dust (old matte)
SiO_2	44.0 per cent.	+	56.9 per cent.	0.7 per cent.
Fe_2O_3	4.5 per cent.	+	6.5 per cent.	5.0 per cent.
Al_2O_3	12.0 per cent.		13.7 per cent.	—
MgO	2.5 per cent.		2.4 per cent.	—
CaO	14.0 per cent.		3.7 per cent.	—

I am indebted to the Joachimstal mining authorities for the sample of the dust taken from the vicinity of their mines. The analysis was made by the London Government Analyst. Drs. C. J. Amor (Mond Nickel Co.) and J. C. Bridges (of the Home Office) have drawn attention to the frequency of lung and nasal cancer in nickel workers. I am indebted to the former for a sample of the dust and the analysis of the "old matte." This also contains iron with some silica in addition to large quantities of nickel, cobalt, copper, and arsenic, and some lead and sulphur. Of course nickel workers, like everyone else, come into contact also with road dust. Animal experiments are being conducted with this nickel dust; iron and other metals may play some catalytic part in development of lung cancer. Concerning the histology of the mouse primary lung cancers there is now no very great difference between these and human lung cancers. At one time the former were regarded as non-metastatic, but in the last year or two I have obtained metastases from lung cancers in seven mice. The squamous-celled carcinoma is a main type of human lung cancer, and is regarded as primary. There is a possibility that such squamous cancers are really secondary to warts on the skin which have become malignant and then regressed, or have been removed by cautery or other means. In my mice, dusted with dust from tarred roads, 70 per cent. showed typical squamous-celled tar cancers of the skin, and several of these had metastases of similar cells in the lung. It would be interesting in the case of human lung cancer to know more of the history of warts on the skin.—I am, etc.,

National Institute for Medical Research, N.W.3, March 26. J. ARGYLL CAMPBELL.

"Gonococcus Antitoxin" for Gonorrhoea

SIR,—We ask leave to deal with certain points raised by Dr. Anwyl Davies in his letter in your issue of March 26 (p. 701), in which he refers to our experiences in the treatment of gonorrhoea with so-called "gonococcus antitoxin." He states that "the cases described in the article apparently received no other treatment than the antitoxin." Our report indicates quite clearly that this was not so. In most of our cases local treatment, in the form of urethral irrigations, was withheld only during the period of administration of "antitoxin"—that is to say, for not more than one to three weeks in the very large majority. We would remind Dr. Davies that this practice of withholding local treatment during the initial stages is one which has been used very successfully by some highly competent venereologists. We do not consider it possible that the extraordinary discrepancy between our results and his could be due to this possible difference in procedure. In this same connexion we quote the concluding paragraph of a letter written by Dr. Davies in your issue of March 6, 1937 (p. 525), in reply to a criticism of the fact that in his report mention of irrigation or other adjuvant treatment had been omitted.

"The question asked by one of your correspondents as to whether adjuvant treatment was employed can be readily answered. Some of the cases quoted had no other treatment, others were treated along routine lines. After all, one does not rely on antitoxin in treating a case of diphtheria to the exclusion of throat sprays, cardiac stimulants, and skilled nursing."

This estimate of the importance of local treatment in gonorrhoea seems to have undergone a change during the past twelve months. Obviously such lack of detail makes it quite impossible to assess the relative parts played by the two forms of treatment in Dr. Davies's original series of cases. There would perhaps be some basis for comparison between our results and those recently obtained in the St. Thomas's Hospital clinic if Dr. Davies would give us precise details as to the general and local treatment which he is using in addition to the injections of "antitoxin," and would also state the average duration of the signs and symptoms of urethritis in these cases and the proportion of them which were found subsequently to have evidence of latent infection.

Dr. Davies writes that a number of his patients who have received daily doses of 1 c.cm. of the "antitoxin" have been free from serious reactions. As we have stated, it was also our experience that some of these reactions could be avoided by radical reduction of dosage. At the same time there was no evidence that our patients benefited, and, in fact, ultimate prolongation of the infection was the rule. It would be interesting to know the reasons which prompted Dr. Davies to use a dosage so much smaller than that which he recommended originally.—We are, etc.,

E. T. BURKE A. H. HARKNESS
J. GABE A. J. KING.

London, W.1, March 29.

Somatic Pain

SIR,—I was much impressed by Sir Thomas Lewis's article on somatic pain in the *Journal* of February 12 (p. 321), but I share Dr. James Mennell's surprise (March 12, p. 593) that Mr. J. H. Kellgren should have omitted mention of the age-old practice of "needling" from his excellent article on referred pain in muscle (February 12, p. 325). I have used paracentesis in cases of chronic muscle pain—lumbago, sciatica, tennis elbow, and the like—for many years, and have found it in suitable cases almost invariably successful if properly performed.

It is well known that muscle tissue is insensible to touch unless the touch sends it into some degree of spasm, thus providing the adequate stimulus for painful sensation. In performing paracentesis, for example, no pain is felt after the initial prick (skin pain) of the needle as it enters

the skin until it strikes that part of the muscle which is affected by the fibrosis, when a pain of the "web" type is momentarily experienced.

The pathology of these painful areas in muscle would seem to fall into two main types.

(1) Where the fibres are bound together by fibrous adhesions and their unequal contractile powers cause tension in the sarcolemma, which sets up the local spasm causing pain. This puts the muscle group as a whole on its guard to prevent this happening, with subsequent "protective" limitation of movement. It is this type of fibrosis which does not benefit by paracentesis but is readily cured by manipulation, which, snapping down the interfibrillar adhesions, permits the muscle to act according to the decrees of the nervous stimulation of its group without interference from stimuli arising from tension in the sarcolemma.

(2) Where a number of fibres are sealed up in one or more areas of lymph organized at the periphery to form an encapsulated sac, any increase of tension on the wall of this sac "hydraulically" causing tension on the sarcolemma, spasm, and pain. It is the momentarily increased tension in the sac as the needle pierces it during paracentesis which causes the pain referred to above. This is the type which, if the area be found, is immediately and dramatically cured by paracentesis, which allows the escape and absorption of the enclosed lymph and permits free working of the muscle once more.

I consider the injection of novocain (save for the purpose of completely abolishing the slight pain of the process in hypersensitive patients) to be superfluous in this type of case, which is immediately eased by the mere rupture of the sac wall by the needle. In the treatment of the first class of case, however, it is unquestionably a great forward step in technique, as by blocking the painful stimuli it inhibits the local reflex protecting the fibrotic muscle, and allows the opposing healthy muscles to pull the fibrotic ones through their full range of movement, thus painlessly permitting the patient to break down his own intermuscular adhesions. I am no advocate of heavy massage, as by the "mallet." If it succeeds in rupturing the encapsulated areas all is well, but if the walls are too tough and it fails, the dull ache that follows would have been unhesitatingly described by Mr. Mantalini as "most demnable!" This subcutaneous surgery is well within the province of the general practitioner, and suffering humanity demands that more attention should be paid to it. But I would warn the practitioner that it needs some training of the tactile sense and a certain degree of experience; and that while "the Colonel's lady and Susie O'Grady are sisters under the skin," he would be wise to tackle the younger sister first! —I am, etc.,

Ashton-in-Makerfield, March 21. GERALD LATHAM.

Treatment of Hay Fever

SIR,—During the last two years we have had a hay fever clinic at the Royal Waterloo Hospital, and it might be of interest at the present season to give you some of the results that have been achieved. The treatment is as follows:

In the first place, all cases are investigated and tested out against pollens of various kinds—trees, grasses, flowers, dust, etc. Where a positive reaction occurs—that is to say, an urticarial wheal of at least half an inch—the patient is immunized. Usually 0.1 c.cm. of the appropriate allergen, working up by 0.1 c.cm. a week to 1 c.cm., is used. We have been using mostly the pollens made by either Allen and Hanburys or Duncan Flockhart. In cases in which this treatment has been tried before and little improvement has followed, zinc ionization has been used. This usually consists of three treatments at weekly intervals. The period of ionization varies from three or five to eight minutes, and the amperage used is between 3 and 8, according to what the patient can stand. The nose, of course, is previously anaesthetized by applying a solution of novocain, 5 per cent. In a further group of cases of vasomotor rhinitis which do not react to either of the above methods, and which have exacerbations during the hay fever seasons, we have found ten injections of calcium Sandoz, associated with ten injections of the patient's blood, given intramuscularly, of great value. Many of the cases that have a catarrhal bronchitis associated with the condition have benefited by inhalations of oxygen, passed over a solution of essential oils through a Collison apneu apparatus.

For the irritability of the eyes we have found the following solution of great help:

℞	Cocaine, 2 per cent....	... ♏ j
	Liquor adrenalin. hydrochlor. ...	... ♏ xx
	Liquor aq. rosae	ad ʒ ss

In more obstinate cases we have also used ephedrine and merthiolate jelly, applied locally.

It will be seen, therefore, that a variety of methods have to be used, and in my experience, even when using proved antigens, the specific vaccination with pollens alone is not enough. The majority of our cases have been of many years' standing, and have had previous therapy along these lines without the desired result being achieved.

To a questionary we have sent out to some eighty-four patients we have received fifty replies: two patients were completely cured for the season; thirty were greatly improved; twelve remained stationary; and in five the condition had become worse. In the last five cases ionization had been used. Hence from our figures improvement occurred in over 60 per cent. of cases, cure in 4 per cent., and failure in 34 per cent. We feel that it is necessary to start treatment early in order to obtain the best results: thus, relief and immunity treatment should start within the next two or three weeks.

I am grateful to Dr. P. M. Deville for helping with the questionary and statistical results.—I am, etc.,

London, W.1, March 17. GERALD SLOT.

Problems of Vitamin B Deficiency

SIR,—Regarding the annotation on problems of vitamin B deficiency in the *Journal* of March 19 (p. 630), in the course of which reference is made to the recently published work of M. W. Poole, I should like to point out a slight inaccuracy in the last sentence, which reads, ". . . and if the more or less negative results are accepted as final it would appear that no supplements of vitamin B to children's diets are really necessary." The word "children" should, of course, be "infants," for the note on Poole's work refers to the latter only. I recently reviewed the subject of vitamin B_1 in the diet of infants and young children, and published the results of a small-scale investigation conducted among babies and toddlers attending welfare centres (*Medical Officer*, 1938, **59**, 107). Among the findings one of the most striking was that although symptoms of probable B_1 deficiency were negligible in infants under 9 months old—for example, anorexia not attributable to other causes was present in only 0.9 per cent., and constipation in 1.9 per cent., of 212 infants—such symptoms were quite common in children over 9 months old, after which age the diet consists chiefly of solid food instead of mainly milk. Thus, anorexia probably due to a vitamin B_1 deficiency was found in 25.6 per cent. of 176 children aged 9 months to 4 years, most of them being between 1 and 3 years. Favourable results were obtained by supple-

menting the diet of these children with foods rich in vitamin B_1. I am almost convinced that when discussing the desirability of supplementing existing diets with vitamin B, at any rate as regards that factor known as aneurin or B_1, we should distinguish between the needs of toddlers or older children and those of milk-fed infants.—I am, etc.,

Oxford, March 22. F. J. G. LISHMAN.

After-effects of Modern Treatment of Carcinoma

SIR,—I consider that Mr. Percy Furnivall has done good service in drawing attention to the untoward results of the radium and *x*-ray treatment of malignant disease (*Journal*, February 26, p. 450). My experience of irradiation therapy in the group of cancers of the lateral fauces, to which Mr. Furnivall specifically refers, closely corresponds with his own. For three years all my cases of faucial cancer were sent for radiation treatment by recognized experts. The results were distressing. Though in some there was initial notable improvement in the malignant condition, all relapsed, all suffered severely with pain—some intensely, requiring large and frequent doses of morphine—all had necrosis of soft and bony tissue, and all died within a year except two. Of these two, one patient, a very early case, died within fifteen months from the date of starting the radiation treatment, with extensive necrosis and with a large fistula, measuring approximately 2 inches by 3/4 inch, from the neck into the pharynx; the other died at the end of a little over two years from the time when first seen, with widespread ulceration showing no tendency to heal, and with necrosis of about a third of the inner surface of one side of the lower jaw.

In these cases it is usually impossible to determine what is the condition with regard to the malignant disease; the inability to open the mouth, the sloughy ulcerated surfaces, the necrosis of bone, and the induration of the soft tissues rendering a distinction between the disease and the effects of the treatment almost impossible, and again making it impossible to estimate the prospects of ultimate cure of the cancer if the patient can be carried through the long-drawn-out misery of radionecrosis. I know nothing of the results of the treatment of these lesions with the radium bomb. It is to be hoped that they will be vastly better than those which have been achieved in the past by radiation therapy.—I am, etc.,

Middlesbrough, March 20. WM. S. DICKIE.

Sulphonamide for Prophylaxis in Midwifery

SIR,—In a recent article (*Journal*, March 12, p. 562) Professor R. W. Johnstone reviewed the results of a trial of sulphonamide for prophylaxis in midwifery. We have been using B. W. and Co. sulphonamide P, 0.5-gramme tabloids four times a day for four days, and as the unit admits patients in labour some may be under treatment for twenty-four to thirty-six hours before actual confinement.

Our results—taking morbidity as a temperature of 100.4° F. on two successive occasions within twenty-four hours in the first twenty-one days of the puerperium—when compared with a corresponding period of last year have been quite promising. The morbidity rate of the control series (574 cases) was 3.5 per cent., and of these (twenty cases) one developed breast abscess and only one had streptococcal septicaemia. In the sulphonamide group (581 cases) the morbidity rate was 1.7 per cent., and of these (ten cases) one had breast abscess and one had signs of acute lobar pneumonia on the third day. Of these ten three had had haemolytic streptococcus on cervical swab, while none had streptococcus on aerobic blood culture.

	Morbid Puerperia	Percentage of Morbidity
Control (574)	20	3.5
Sulphonamide (581) ..	10	1.7

While it must be admitted that comparison with a period one year before is not of great value, since it does not ensure that the infecting streptococci were of similar virulence, the results suggest a continuance of the treatment. I wish to express my thanks to Mr. T. S. Holmes, F.R.C.S., F.C.O.G., for permission to publish them.—I am, etc.,

Belfast, March 23. J. H. MACLAUGHLIN, M.B., B.Ch., R.M.O., Jubilee Maternity Hospital.

Coupons for the Sherman Bigg Fund

SIR,—Four months ago you kindly allowed me to appeal to the profession for help in collecting coupons from the *Daily Mirror* and *Daily Sketch* on behalf of the Sherman Bigg Fund, administered by the Royal Medical Foundation of Epsom College. As this scheme ends on March 31 you may be willing to allow me to report the results.

First, may I give you a brief résumé of the work of the Sherman Bigg Fund for 1937? The income from Mr. Bigg's bequest was £155; and special donations to augment it raised the total to £774, which, for the third year's working of the Fund, may be regarded as reasonably satisfactory. From this, thirty-two educational grants were made for girls and boys, and eight maintenance grants for widows or orphans.

Next, as to the coupon collection. From various friends whose help had been enlisted before I wrote to you more than 20,000 coupons have been received, value over £10. The great bulk of these have come from the medical superintendents of several London County Hospitals, whose kindness I desire to acknowledge most thankfully. Anonymous correspondents whom I desire also to thank, have sent in about 1,300 coupons; 1,000 of these in one envelope may have come from one of the hospitals aforesaid; and if that is so the total response of the medical profession to my letter has been of the value of not quite three shillings. Any comment of mine upon this fact would be expressed in language which you, Sir, would probably not care to print: so, if you think that any is desirable, perhaps you would be so good as to supply it yourself. I am, however, still hoping for collections to reach me after the end of the month.—I am, etc.,

HENRY ROBINSON.

49, Bedford Square, W.C.1, March 24.

*** We could think of comment as bitter as any that Dr. Robinson could express—and his pen can be corrosive enough—but it may be better to content ourselves with saying that the profession clearly owes him conscience money in this matter, and we hope there will be a rush to pay it to him.—ED., *B.M.J.*

Corporal Punishment

SIR,—I do not propose to discuss whether corporal punishment should or should not be abolished, but it is clear that considerable confusion exists in most people's minds between justice and punishment. A man who commits an assault commits two offences—one against the individual assaulted and one against the State whose law he breaks—and, if justice is to be strictly

followed, both accounts must be balanced. Justice between the assaulter and the assaultee is logically effected by inflicting on the former the same amount of pain, distress, incapacity, and expense as was inflicted on the latter. The account between the individuals being thus balanced, justice between the assaulter and the State must be effected by a suitable penalty.

At the present time there seems to be a general disposition to regard justice as a matter solely between the State whose law is broken and the assaulter who breaks it, and if this restricted conception is adopted corporal punishment as a means of justice is obviously illogical, for the State has suffered neither pain, distress, nor incapacity. The crime being impersonal so far as the State is concerned, it may quite legitimately discard the balancing of the account between itself and the assaulter and concentrate its endeavour on trying to prevent him breaking its laws again. Whether this attitude is desirable or not may be debated, but if it is adopted justice is not the word which should be applied to it. If a person who has been laid up for a month with a broken head and other injuries retains any sense of humour, the news that the State is redressing his affliction by an earnest endeavour to dissuade the person who assaulted him from committing a like crime again must surely make him laugh.—I am, etc.,

London, W.1, March 25. VICTOR BONNEY.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

Sir Patrick Laidlaw, F.R.S., will give the Rede Lecture in the Regent House on Friday, May 20, at 5.30 p.m. His subject is "Virus Diseases and Viruses."

E. T. C. Spooner, M.A., M.R.C.S., has been reappointed University Lecturer in Pathology, and R. I. N. Greaves, M.A., M.B., and G. P. McCullagh, M.A., M.D.Belf., have been reappointed University Demonstrators in Pathology. G. C. Grindley, M.A., has been appointed University Lecturer in Experimental Psychology.

The Managers of the Frank Edward Elmore Fund have appointed J. C. Sinclair, M.D.Toronto, to a studentship from April 1, 1938.

On February 4 the University accepted the offer of the Rockefeller Foundation to provide £8,000 towards the support of research in the Department of Medicine over the five-year period January 1, 1938, to December 31, 1942, the amount available in any one year of the grant not to exceed £1,600. The Faculty Board of Medicine now recommends that this grant be used for the establishment of three posts of Assistant in Research in Medicine, with a tenure limited to the period of the grant. The General Board, concurring with the Faculty Board, recommends that these three posts be established from July 1, 1938, and that appointments to them be made by the Appointments Committee of the Faculty of Medicine, with the approval of the General Board, each for a period not exceeding five years, or for so long as the Rockefeller Foundation continues the grant to the University for this purpose, whichever period is the shorter.

UNIVERSITY OF LONDON

At a meeting of the Senate, held on March 23, with the Vice-Chancellor in the chair, R. V. Christie, M.D.Ed., M.Sc.McGill, was appointed from April 1 to the University Chair of Medicine tenable at St. Bartholomew's Hospital Medical College.

F. R. Winton, M.D.Camb., has been appointed, as from October 1, to the University Chair of Pharmacology tenable at University College. Since 1933 he has been Reader in Physiology in the University of Cambridge.

UNIVERSITY OF BRISTOL

The University of Bristol has invited Sir William Savage, formerly medical officer of health for the County of Somerset, to receive the honorary degree of M.D. in July.

UNIVERSITY OF LEEDS

The following candidates have been approved at the examinations indicated:

M.D.—Doris B. Brown, D. Heap, E. James, E. J. Wayne.
CH.M.—M. B. Khan.
FINAL M.B., CH.B.—*Part I:* A. N. T. Aikman, T. Akroyd, J. B. Ashmore, C. E. Astley, P. D. Bedford, C. H. Boyd, A. Colbert, J. B. Coltman, E. Cope, Patricia M. Dobinson, Ruth Edmonds, G. Farrer, J. M. Fitton, M. M. Frais, M. Goldberg, H. Goldstone, Mary E. Goodson, F. Gouldsborough, A. Green, G. Higgins, J. Hirst, H. J. M Holland, Adelaide J. G. James, F. Jennings, R. E. Johnson, D. E. Mitchell, L. H. Moss, C. Pickard, J. D. Pickup, T. B. Purdy, P. Rapaport, G. N. Reed, L. Rosenthal, F. Sandy, J. F. Scannell, J. V. Schofield, F. N. Shuttleworth, Ida M. Shuttleworth, S. A. Smith, S. A. Swanson, E. S. Tan, P. E. R. Tattersall, A. L. Taylor, P. J. Waddington, R. P. Warin, K. D. Wood, I. Young. *Parts II and III:* *W. M. H. Shaw, †J. K. Drucquer, †E. W. Jackson, †W. R. Jackson, †R. Orton, G. R. Bedford, D. Benson, J. Braham, W. A. Bridgwood, W. L. Carruthers, D. B. Feather, Dorothy Haigh, R. A. S. Keighley, E. S. Levy, S. Madden, W. Maude, R. B. Raj, G. F. Reid, Phyllis M. Richards, J. F. Robinson, J. W. Scholey, S. H. Segerman, A. P. B. Waind, A. J. Ward, T. I. Watkins, D. C. Williams, Kathleen Wilson.
DIPLOMA IN PSYCHOLOGICAL MEDICINE.—W. Sharp.
DIPLOMA IN PUBLIC HEALTH.—‡W. Hobson, ‡R. S. Illingworth, T. W. Smailes.

* With first-class honours. † With second-class honours. ‡ With distinction.

The following medals and prizes have been awarded:

Hardwick Prize: •J. K. Drucquer, E. W. Jackson. *Hillman Prize in Clinical Medicine:* I. R. Gray. *McGill Prize and Edward Ward Prize:* W. M. H. Shaw. *Infirmary Scholarships:* D. L. Richardson and R. I. T Lloyd. *Essay Prize in Anatomy and Physiology (Obstetrics and Gynaecology):* I. B. Gartside ; *commended:* R. E. Shaw.

UNIVERSITY OF SHEFFIELD

The following candidates have been approved at the examination indicated:

FINAL M.B., Ch.B.—*Parts II and III:* G. E. Wright (with second-class honours), A. K. Beardshaw, R. B. Davies, H. D. Elliott, W. L. Rose, J. W. Wier.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW

At the monthly meeting of the Royal Faculty of Physicians and Surgeons of Glasgow, with Dr. John Henderson in the chair, Samuel Lazarus, M.D., M.R.C.P., was admitted a Fellow of the Faculty.

The Services

EFFICIENCY DECORATION

The King has conferred the Efficiency Decoration of the Territorial Army on Colonel G. J. Linklater, O.B.E., Major C. B. Jones, Major D. R. Jones, Major J. Rigby, and Major D. Ross.

DEATHS IN THE SERVICES

Colonel THOMAS EDWARD DYSON, Bombay Medical Service (ret.), died at Monte Carlo on March 22, aged 77. He was born on November 26, 1860, the son of the Rev. Simeon Dyson of Idle, Yorkshire, and was educated at Edinburgh, where he graduated M.B., C.M. in 1883. He entered the Indian Medical Service as surgeon on September 30, 1886, attained the rank of colonel on January 12, 1914, and retired on January 10, 1919. He received the Kaisar-i-Hind medal (first class) on November 9, 1901. He had been a member of the British Medical Association for thirty-four years.

Lieutenant-Colonel JAMES DANIEL CROWE, R.A.M.C. (ret.), died at Hove on March 23, aged 93. He was born on November 7, 1844, and was educated in Dublin, where he took the L.R.C.P. and S.I. in 1867. He entered the Army as assistant surgeon on October 1, 1867, became surgeon major after twelve years' service, and retired on December 31, 1887, with the honorary rank of brigade surgeon, subsequently changed to lieutenant-colonel under the notification of August 9, 1898. In the old regimental days he served in the 21st Foot, the Royal Scots Fusiliers, and in the Royal Artillery. There must be few men still living on the retired list of the Royal Army Medical Corps who served as regimental officers. After retirement he was employed at Weymouth. He had been granted the bronze medal of the Royal Humane Society.

Medical Notes in Parliament

The House of Lords this week discussed foreign affairs and made progress in Bills. The House of Commons spent a day on Scottish business and also considered the Cinematograph Films Bill and the Coal Bill.

The Hairdressers (Registration) Bill was rejected by the House of Lords on second reading on March 23. In the House of Lords, on March 29, the Royal Sheffield Infirmary and Hospital Bill was read the third time and passed. Later that day the Bill was read a first time in the House of Commons. The Housing (Financial Provisions) Bill was read the third time in the House of Lords on March 29 and passed.

The committee stage of Viscount Dawson of Penn's Infanticide Bill is set down for Thursday, April 7, in the House of Lords.

The Divorce and Nullity of Marriage (Scotland) Bill and the Marriage Bill were each read a second time without debate by the House of Commons on March 22. On March 29 Sir Kingsley Wood presented the Housing (Rural Workers) Amendment Bill, which amends the Housing (Rural Workers) Acts, 1926 and 1931. On the same day the Housing (Agricultural Population) (Scotland) Bill passed through report stage and was read the third time. The Criminal Procedure (Scotland) Bill was read the second time.

Morale of Air Force Officers

In the House of Commons on March 21 the Air Estimates were considered on report.

Mr. GARRO-JONES referred to the morale of officers in the Royal Air Force and the consumption of alcoholic liquor. He said that unless that source of weakness was carefully watched and kept under control it would affect the efficiency and nerve of pilots in the Force.

Mr. CHURCHILL said that all he had been able to learn supported the view that there was no ground for any general stigmatization of the habits which prevailed in the Air Force.

Colonel MUIRHEAD said that the question of officers drinking had been raised with him privately by a number of people. They were very anxious to know whether every check was kept on the physical, and with it the mental, capacity of pilots, and whether every step was taken to ensure that any deterioration in morale or capacity was noted. If Members would read some of the Regulations and instructions to the medical officers in the Royal Air Force they would see that one of the things that was stressed was the necessity for the medical officers to have constant contact with the pilots, not only in their work but in their ordinary life and games, so that any deterioration in morale or efficiency would be noticed at an early stage. He was sure members would like to be reassured on that point.

The Vote was agreed to.

Admission of Austrians to Britain

On March 22 Sir SAMUEL HOARE said that the policy to be adopted as regards the admission of Austrians to this country had received the careful and sympathetic consideration of the Government. He was anxious that admission should not be refused to suitable applicants, including persons whose work in the world of science, or arts, or business and industry might be advantageous to this country. It must be remembered that even in the professions the danger of overcrowding could not be overlooked, while in the sphere of business and industry the social and economic difficulties must be taken into account.

Replying to Mr. Bevan, Sir SAMUEL HOARE said that whether an individual should practise his profession in this country was a question for the professional organizations.

Mr. MANDER asked if any special machinery was going to be set up to help and guide these professional and other people on their chances of coming in. Sir SAMUEL HOARE said it would be necessary to have some further organization. He was informed that discussions would be needed between the Foreign Office and other authorities, and pending those discussions he could not add to the announcement he had made.

Treatment of Rheumatism

Sir KINGSLEY WOOD was asked, on March 24, whether he would set up a committee to consider the best methods of the treatment of rheumatism and the provision of facilities for this treatment. He replied that work in this connexion was already undertaken by the Empire Rheumatism Council in co-operation with a special committee of the Royal College of Physicians. The Medical Research Council also encouraged and assisted research in the various aspects of this disease.

Food and Drugs Bill

The second reading of the Food and Drugs Bill was moved in the House of Lords on March 24 by Lord GAGE. He said this was the third Bill dealing with local government and public health based on the work of a Departmental Committee appointed in 1929, originally under the chairmanship of Lord Chelmsford and subsequently under Lord Addison. The Bill dealt in the main with the law of food and drugs, but included provisions relating to markets, slaughter-houses, and cold-air stores. The Bill did not deal with matters of weights and measures. As the law relating to adulteration of food was the same in London as elsewhere, the present Bill covered the County of London. It consisted of 102 clauses and four schedules. Part I contained general provisions as to food and drugs and re-enacted the major part of the Adulteration Act of 1928, together with provisions from the Public Health Act, 1875, dealing with the seizure and condemnation of unsound food. It also included power for the Minister of Health to make regulations on the importation, preparation, storage, sale, and delivery of food. Part II dealt with milk, dairies, and artificial cream, and in the main reproduced provisions from the Milk Acts of 1915 and 1922 and the Artificial Cream Act of 1929. Part III dealt with certain other kinds of food, the most important being bread and flour. There were also Part IV on importation offences, Part V on markets and slaughter-houses, and Part VI on enforcement of legal proceedings. The Bill combined consolidation with a limited amount of amendment. The Government proposed to invite the two Houses to appoint a Joint Select Committee on it.

Lord MANCROFT said the Bill should provide that when bread or any food was delivered at the consumer's house it should be protected against insanitary handling. He saw nothing in the Bill about delivery of milk. Although trouble was taken to produce pasteurized milk and clean milk, yet the milk had to be poured out of a bottle that had been left outside a house and there defiled. The public was straining at pasteurization but was swallowing filth. The Bill should also empower local authorities to prevent the exposure of vegetables for sale at ground level, where they might be defiled by dogs.

Lord ADDINGTON, as chairman of the Departmental Committee which drafted the Bill, said they had been unable to include all the regulations regarding cleanliness of food which they would have liked to bring in. But the Minister might make Milk and Dairy Regulations dealing with the distribution of milk, the scalding or closing of churns and other vessels, and the abstraction of fats. They had gone as far as they could, consistently with the present law, in this direction. Another clause allowed regulations to be made for preventing danger to health in the exposure for sale and delivery of bread or flour. The regulations would largely cover the points Lord Mancroft had raised.

Lord STRABOLGI asked for prohibition of the practice of refilling dirty milk bottles by milk roundsmen.

The Bill was read a second time without a division, and on the motion of Lord GAGE the House agreed to refer it to a Joint Committee of both Houses.

On March 28 the House of Commons agreed to participate in the Joint Select Committee on the Bill.

Air Raid Precautions for Hospitals.—Mr. GEOFFREY LLOYD announced on March 17 that a handbook would be available shortly on such structural precautions as were possible for the protection of hospital patients, staff, and buildings against injury in air raids. A survey of the position of the hospitals in London was being made by the Ministry of Health and the medical authorities. Pending the issue of the handbook the Home Office would be glad to advise any hospital. Mr. W. T. KELLY asked that the survey should include mental hospitals.

Medical Relief for Spain.—Miss RATHBONE, on March 21, asked the Prime Minister whether, in view of the casualties caused by the bombardment of the civilian population of Barcelona and the resultant shortage of medical and nursing personnel, medical supplies, and anaesthetics, the Government would make a grant for these purposes. Mr. CHAMBERLAIN said the Government had already made a contribution to the International Red Cross Society for the provision of medical and other forms of relief in Spain, and were considering the desirability of a further contribution.

EPIDEMIOLOGICAL NOTES

Diphtheria and Scarlet Fever

Diphtheria appears to be on the increase in England and Wales. During the week under review 1,556 cases were notified with 41 deaths, as against 1,492 cases in the previous week and 40 deaths. London did not share in this increase, there being 159 cases compared with 170 in the previous week, while 5 deaths were reported in both weeks. Slight increases in notifications were noticed in Eire and Northern Ireland, while in Scotland notifications decreased from 267 to 261.

Scarlet fever continues to decrease in England and Wales—2,307 compared with 2,515—but the number of deaths showed an increase of 2 over the previous week. Notifications decreased in London from 196 to 189, but there were 3 deaths, compared with none in the previous week. Fewer notifications were reported from Scotland, Eire, and Northern Ireland, but the deaths were the same as in the previous week—1 each for Scotland and Eire and none for Northern Ireland. The notifications of diphtheria and scarlet fever in England and Wales as a whole remain greatly in excess of the median value for the corresponding weeks of the last nine years, while in London diphtheria figures are slightly less and the scarlet fever figures considerably less.

Measles

In the 125 Great Towns there were 66 deaths from measles, compared with 55 in the previous week ; of these, 18 (13) occurred in London, 3 (7) in Liverpool, 6 (3) in Manchester, 6 (2) in Plymouth, 2 (4) in Sheffield. The figures in parentheses denote the number of cases in the previous week. The London epidemic appears to have reached its peak, the number of cases reported from the L.C.C. elementary schools having dropped from 2,521 in the previous week to 2,456 in the week under review, while the average daily admissions to the L.C.C. fever hospitals were 94. The number of cases of measles under treatment in the L.C.C. fever hospitals on Friday, March 18, was 2,079, compared with 1,892 in the previous week ; on the same day there were under treatment in these hospitals 1,211 (1,275) cases of diphtheria, 830 (840) of scarlet fever, and 271 (271) of whooping-cough. The figures in parentheses refer to the numbers in the previous week. Notifications in the eleven metropolitan boroughs in which measles is notifiable for the week ended March 19 were 1,317 (1,214), distributed in the different boroughs thus: Battersea 142 (143), Bermondsey, 60 (54), Finsbury 30 (27), Fulham 81 (51), Greenwich 111 (68), Hampstead 68 (69), Lambeth 377 (355), St. Pancras 143 (172), Shoreditch 31 (17), Southwark 204 (207), Stepney 70 (51). The figures in parentheses denote the numbers for the previous week. It may be inferred from these figures that the decrease among the older children in the schools is more than offset by an increase in incidence among children under school age, although no information is available from the boroughs in which measles is not notifiable. There were 18 deaths—an increase of 5 over the previous week. In Scotland 1,547 cases were notified, compared with 1,718 in the previous week ; the figures for Glasgow were 1,037 (1,188), Edinburgh 90 (105), Paisley 55 (79), Dundee 115 (140), Aberdeen 107 (51). The figures in parentheses refer to the notifications in the previous week. During the week there were 24 deaths from measles, of which 19 occurred in Glasgow, compared with 16 and 11 respectively in the previous week. In Northern Ireland there were 106 cases, of which 98 occurred in Belfast, compared with 171 and 168 respectively in the previous week, while the deaths were 8, of which 6 were in Belfast, compared with 18, all occurring in Belfast, in the previous week. During the week under review no deaths from measles were reported from Dublin.

Psittacosis

According to reports in the Press an outbreak of sickness in the Parrot House of the London Zoo is suspected to have been one of psittacosis. A commissionaire who had been in contact with the birds has died in hospital "of a fever resembling psittacosis." Three keepers from the Parrot House are also reported to be ill. A leading article on the control of psittacosis appears in this issue at page 737.

Cerebrospinal Fever

In the *Weekly Epidemiological Record* of the Health Section of the Secretariat of the League of Nations of March 24 a map of the world is included showing the distribution of cerebrospinal fever in the different countries for the years 1935–6–7. No figures were available from India, South America, and U.S.S.R. The figures show that the seasonal increase in the incidence of cerebrospinal fever, greater than in 1936, was reported in England and Wales, Germany, Greece, France, Italy, Poland, Scotland, and Yugoslavia, while there was a decrease in Japan and Korea. In Africa the disease, advancing from the east and south, was encountered in epidemic form in French Equatorial Africa in 1936, and in the northern provinces of Nigeria in the beginning of 1937. It appears to have reached the Niger Territory towards the end of 1937, when, during the week ending February 28, there were 273 cases with 178 deaths, bringing the total during the epidemic to 1,084 cases and 572 deaths. In the United States of America 377 cases were reported for the four-week period ended January 29, compared with 542 in the corresponding period of 1937 and 670 in 1936.

Small-pox

The P. and O. liner *Strathaird* was put in quarantine on its arrival at Adelaide on March 26 because of the death from small-pox of a woman passenger, aged 35, who had joined the ship at Bombay. On March 25 the ship surgeons spent five hours vaccinating unvaccinated passengers and members of the crew.

In the week ended March 19 there were 236 cases of small-pox reported in Hong Kong with 192 deaths, compared with 214 cases and 128 deaths reported in the previous week. During the same week in British India there were reported in Bombay 212 (234) cases of small-pox, in Calcutta 261 (185), in Madras 69 (64). The figures in parentheses refer to cases reported in the previous week.

Typhus

In the week ended March 12 there were 411 cases of typhus in Morocco, of which 70 were at Casablanca, 56 at Marrakesh, 47 at Rabat, 19 at Agadir. In the same week in Tunisia incidence of typhus fell from 100 to 41 ; in Egypt there were 68 cases, compared with 36 in the previous week.

No. 11

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended March 19, 1938.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for : (a) England and Wales London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland. Median values for the last 9 years for (a) and (b).

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for : (a) The 125 great towns (i) in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns (ii) in Northern Ireland.

A dash — denotes no cases ; a blank space denotes disease not notifiable or no return available.

Disease	1938					1937 (Corresponding Week)					1929-37 (Median Value Corresponding Weeks)	
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)	(a)	(b)
Cerebrospinal fever	41	4	11	1	—	25	4	12	1	—		
Deaths		5	2				1	2				
Diphtheria	1,556	159	261	61	44	1,068	122	181	34	26	1,112	166
Deaths	41	5	8	3	—	36	4	2	3	3		
Dysentery	125	20	50		—	20	6	15		—		
Deaths			—	—	1			1	—	—		
Encephalitis lethargica, acute	4	1	1		—	8	1	—		—		
Deaths		3	—				1	—				
Enteric (typhoid and paratyphoid) fever	17	—	7	7	—	24	6	4	3	1	23	—
Deaths	—	—	—	—	—	—	—	—	1	—		
Erysipelas			84	10	5			77	6	4		
Deaths		2	—				4	2				
Infective enteritis or diarrhoea under 2 years												
Deaths	50	15	10	4	—	45	14	8	8	5		
Measles			1,547		106*			176		3		
Deaths	66	18	24	—	8	19	1	2	1	—		
Ophthalmia neonatorum	118	15	34	1	1	90	7	30		1		
Deaths												
Pneumonia, influenzal ‡	1,409	110	9	3	20	1,288	99	29	19	6	1,658	151
Deaths (from Influenza)	76	5	4	—	—	171	21	11	2	3		
Pneumonia, primary			279	10				228	15			
Deaths		26		22	16		31		19	19		
Polio-encephalitis, acute	1	—				1	—					
Deaths		—					—					
Poliomyelitis, acute	5	1	1		—	3	2	2		—		
Deaths		—	—				—	—				
Puerperal fever	7†	7	17	3	1	37	2	11		—		
Deaths		—					—					
Puerperal pyrexia	193	14	17		2	115	11	26		5		
Deaths												
Relapsing fever	—	—			—	—	—	—		—		
Deaths								—				
Scarlet fever	2,307	189	404	61	80	1,791	199	296	78	43	1,930	271
Deaths	8	3	1	1	—	1	—	1	2	—		
Small-pox	—	—	—		—	1	—	—		—		
Deaths	—	—	—	—	—	—	—	—	—	—		
Typhus fever	—	—	—	—	—	—	—	—	—	—		
Deaths			—	—	—			—	—	—		
Whooping-cough			93		15			720		4		
Deaths	16	3	2	3	—	21	3	25	6	—		
Deaths (0-1 year)	408	89	88	34	21	461	89	96	46	25		
Infant mortality rate (per 1,000 live births)	68	73				74	74					
Deaths (excluding stillbirths)	5,225	1,042	719	222	161	5,982	1,205	868	264	199		
Annual death rate (per 1,000 persons living)	12.9	13.1	13.1	15.0	14.3	14.9	15.0	16.0	18.0	19.0		
Live births	7,022	1,364	961	304	243	6,586	1,269	964	312	264		
Annual rate per 1,000 persons living	17.3	17.2	19.6	20.5	21.5	16.4	15.8	19.7	21.3	25.3		
Stillbirths	249	35				281	51					
Rate per 1,000 total births (including stillborn)	34	25				41	39					

(i) 122 great towns in 1937.
(ii) 9 " " " "

* 98 cases in Belfast alone.
† After October 1, 1937, puerperal fever was made notifiable only in the Administrative County of London.

‡ Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

Obituary

R. COZENS BAILEY, M.S., F.R.C.S.

Consulting Surgeon to St. Bartholomew's Hospital

Many St. Bartholomew's men in various parts of the world will learn with regret of the death of Mr. Robert Cozens Bailey, who before his comparatively early retirement from hospital and private practice was well known as an operating surgeon and teacher of surgery. He died at East Cowes, Isle of Wight, on March 18, aged 70.

At St. Bartholomew's Hospital Mr. Bailey had a brilliant student career. In 1890, the year in which he qualified with the English Conjoint diplomas, he won the Brackenbury surgical scholarship, and graduated M.B. and B.S.Lond., with honours in medicine. In 1891 he obtained the M.S. degree, with gold medal, and in 1893 he became F.R.C.S. Three years later he won the Jacksonian Prize of the Royal College of Surgeons of England for his essay on the pathology, diagnosis, and treatment of diseases of the prostate gland. At the close of 1903, after years of successful teaching in the Medical School, he was elected assistant surgeon to St. Bartholomew's and was promoted full surgeon in January, 1913.

In the company of his house-surgeons and dressers Bailey was always direct and to the point and excelled at bringing out the practical aspects of the matter under discussion. Something definite and clear always stuck in the minds of those who attended his lectures or whom he taught in the wards or the operative surgery room. He was kindly and sympathetic to the individual needs of the student, and his former work in the dissecting rooms gave an anatomical background to his surgical teaching which proved most helpful to pupils after they had gone into practice. With his composed manner, sprucely dressed square figure, abundant locks and moustache, and unfading smile, Bailey was a familiar personality in the hospital square, and his resignation from the senior staff long before reaching the age limit deprived Bart's of a very able surgeon.

Dr. JAMES LOUIS EDGEWORTH SOMERS, who has been described as "the pioneer doctor" of the Mornington Peninsula, Australia, died at his home in Mornington early in February at the age of 74. Born in Roscrea, Ireland, he was educated at Stonyhurst College, England, Dublin and Cambridge Universities, and St. Mary's Hospital. In 1883 he obtained the diplomas L.R.C.S.I. and L.A.H.Dublin when he was only 19. While a student in Dublin he was called upon to identify the body of Lord Frederick Cavendish, who was murdered in Phoenix Park. In his early years he travelled extensively and practised in South America and Spain. While serving as a surgeon at Fort Juby in West Africa he was seriously wounded in a skirmish and was rescued by a friendly tribe of Arabs, with whom he lived for two or three years before returning to civilization. Always very active, he regularly rode his horse round Mornington until the day before his death. In the early 'nineties he went out to Australia and toured Queensland on foot. He then settled in Mornington and built up a large practice extending over outlying districts. Dr. Somers held the commission of surgeon captain on the Army Medical Staff of Victoria, retiring eventually with the rank of major. At the time of his death he was health officer of the Mornington Council. He had been a member of the British Medical Association for thirty years. He was an intimate friend of the late Sir Roger Casement, whom he had known in Africa. On the day before he died he rode on horseback to the local police court, where he presided over the cases list; after the closing of the court he completed his round of professional visits. Until about two years ago he never missed in winter or summer a daily swim at the Mornington Baths; he was always an enthusiast for open-air recreation, and had been president of the Mornington Racing Club. He was actively associated with the erection of a fine war memorial in Mornington.

Dr. ARTHUR DONALD ROBERTS, who died on February 7 at his home in Hampstead, had been a member of the British Medical Association for many years. He studied medicine in Edinburgh and qualified L.R.C.P.Ed., L.R.C.S.Ed., L.R.F.P.S.Glas. in 1906. He had a long and varied experience. He practised for some time as ship's doctor, and also worked in the Tropics. Later he was engaged in North Wales and South Wales. In 1924 he began practice in Dalston Lane, Hackney, and remained there until last year, when his health gave way. Dr. Roberts (writes a correspondent) was one of the kindliest of men, and in his daily living was always ready to help all with whom he was in contact. He showed consideration for everybody except himself, and bore his sufferings with fortitude and cheerfulness. To all who knew him—relatives, friends, and patients—there remains the memory of a life of good will and of the true spirit of service.

Dr. HENRY ERNEST KING FRETTS (formerly Fretz), assistant surgeon to the Weymouth and District Hospital, died at Parkstone, Dorset, on March 14 while on a journey to France. He had been in poor health for the last year or two. Born in the West Indies, he received his medical education in Edinburgh, where he took the triple Scottish qualification in 1910 and proceeded F.R.C.S.Ed. in 1914. His first hospital appointments were those of senior house-surgeon to the Norfolk and Norwich Hospital and resident surgical officer to the Sunderland Infirmary. During the war he held a commission as surgeon in the Navy, and subsequently returned to the West Indies and practised at Trinidad for about six years. In 1925 he started practice in Weymouth, where he became widely popular. He joined the British Medical Association in 1923, and contributed articles to the *British Medical Journal* in the two following years. He held the certificate of the London School of Tropical Medicine, and the second of these articles was on "Transient Glycosuria in Scorpion Stings."

Dr. FREDERIC ARCHIBALD HOPE MICHOD died suddenly at Brisbane, Australia, on March 19, aged 65. He received his medical education at St. Mary's Hospital, obtaining the diplomas M.R.C.S., L.R.C.P. in 1897, and graduating M.B.Lond. in 1898. He went out to Australia and practised in Brisbane, where he was surgeon gynaecologist to out-patients at the General Hospital and physician to the ante-natal clinic at the Lady Bowen Hospital. He received the diploma M.C.O.G. in 1929. Dr. Michod contributed articles on obstetrical and gynaecological subjects to the *Australian Medical Journal* in 1923 and 1929. He became a member of the British Medical Association in 1910 and was president of the Queensland Branch in the year 1931–2.

A veteran member of the medical profession, Dr. JOHN FOOT CHURCHILL, J.P., died on March 24 at West Malvern, aged 95. He was a student of Charing Cross Hospital and qualified M.R.C.S., L.R.C.P., and L.S.A. in 1864. Most of his professional life was spent at Chesham in Buckinghamshire, where he held many public appointments and was honorary medical officer to the local hospital. He had long retired from active work, and gave up membership of the British Medical Association at the age of 80.

Dr. SANFORD M. WITHERS, director of the Denver Cancer Clinic, Colorado, U.S.A., died on March 8 from aplastic anaemia following exposure to *x* rays. He was in his forty-seventh year.

Medical News

The House of the British Medical Association, including the Library, will be closed for the Easter holiday from 5 p.m. on Thursday, April 14, until 9 a.m. on Tuesday, April 19 (Library 10 a.m.).

The House and Library of the Royal Society of Medicine will be closed for the Easter holiday from Friday, April 15, to Monday, April 18, both days inclusive. The Library will be closed at 6.30 p.m. on Thursday, April 14, and on Tuesday, April 19.

In our advertisement columns this week the Senate of the University of London invites applications for the Chair of Anatomy, tenable at the London Hospital Medical College, at a salary of £1,000 per annum.

The annual meeting of the Society for the Study of Inebriety will be held at 11, Chandos Street, W., on Tuesday, April 12, at 4 p.m. After the election of officers, etc., Dr. Adolphe Abrahams will open a discussion on "Alcohol, Tobacco, and Other Drugs in Relation to Physical Efficiency."

The Earl of Bessborough will preside over the Health Congress of the Royal Sanitary Institute to be held at Portsmouth from July 11 to 16. The Congress will be divided into sections dealing with preventive medicine; architecture, town planning, and engineering; maternity, child welfare, and school hygiene; veterinary hygiene; national health insurance; hygiene of food; tropical hygiene. There will also be conferences of representatives of local authorities, medical officers of health, engineers and surveyors, sanitary inspectors, and health visitors.

The fourth International Congress of Comparative Pathology will meet in Rome from May 15 to 20, 1939, under the auspices of the Italian Government. The congress comprises three sections—human medicine, veterinary medicine, phytopathology—and the subjects for discussion are ultravirus diseases, heredity in pathology, function of the associated antigens and regressive processes in plants. The official languages are Italian, French, English, German, Spanish. Further information may be had from the honorary secretary, British National Committee, 10, Red Lion Square, London, W.C.1, or the general secretary, Consiglio Nazionale delle Ricerche, Piazzale delle Scienze, Rome.

A meeting of the International Union against the Venereal Peril will be held at Algiers on April 21 and 22, when the chief subject for discussion will be the modern chemotherapy of gonorrhoea.

As from May 7 the Saturday afternoon out-patient clinic at St. John's Hospital for Diseases of the Skin, 5, Lisle Street, Leicester Square, W.C., will be transferred to Saturday morning from 9.30 to 11.30.

In the *Daily Telegraph* of March 17 it was reported that the Minister of Public Welfare in the Ontario Government had introduced a Bill in the Legislature requiring that applicants for marriage licences shall be in possession of certificates from a qualified medical practitioner. These must certify that the applicants are free from venereal disease fifteen days before the date of the proposed marriage. It is not suggested that applicants need prove that they have never suffered from venereal disease provided they have been cured.

On March 26 Mr. Edward Baron opened the new pathological department of the Royal South Hants and Southampton Hospital. The Baron Trustees had made a grant of £2,000 towards the cost. The president of the hospital, Mr. Lionel de Rothschild, and 150 guests attended the ceremony. The department is housed in a two-story building, with the office, consulting and preparation rooms and animal house on the ground floor, and four laboratory rooms on the second.

The February issue of the *Irish Journal of Medical Sciences* has a Rotunda Hospital Supplement containing a short history of the hospital compiled by Dr. T. Percy C. Kirkpatrick.

Beginning January 1, 1938, the *Journal of Morphology*, heretofore a quarterly, is being published bimonthly, on the first of January, March, May, July, September, November. A volume will contain 600 pages, as formerly, and will be issued in three numbers. Two volumes will be published annually. The price is reduced to $10.00 per volume, domestic; $10.50 per volume, foreign. Subscriptions should be addressed to the Wistar Institute of Anatomy and Biology, Woodland Avenue and Thirty-sixth Street, Philadelphia, Pa.

The King has granted Dr. Hugh S. Stannus authority to wear the Insignia of Chevalier of the Légion d'Honneur conferred upon him by the French Government.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

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QUERIES AND ANSWERS

Excessive Secretion of Wax

Dr. G. C. PETHER (Buxton) writes: Can any reader of the *Journal* acquaint me with the causes of, and remedies for, excessive wax formation in the ear?

Urticaria

"R. W. N." writes: In your issue of March 19 "C. de G." asks for suggestions for the treatment of urticaria in a boy of 5 years. Lest he be unaware of it, may I pass on to him the advice once given to me which I have frequently, but not quite invariably, found effective? Autohaemotherapy. If the technical difficulties present too great an obstacle for him, as may well be the case in so small a sufferer, it is well worth while obtaining skilled assistance from a colleague more *au fait* with intravenous technique. The blood collected from a suitable vein is to be injected intramuscularly at weekly intervals. Possibly blood from a parent would do, but of this I have no experience. *Inter alia*, has pituitrin been tried intramuscularly?

Glycosialia?

"McM." writes: I am rather interested in Dr. Isobel G. Smith's query in the *Journal* of March 12 (p. 604). In my area, owing to there having been lead in the water some thirty years ago, there is a marked renal factor as a cause of death in a large number of the older people. I have noticed as a constant symptom that they have a dislike of sweet foods, and in some instances a constant sweet taste in the mouth, though this is not in my experience as obvious as in Dr. Smith's case. I would suggest that Dr. Smith investigates the renal function of her patient, when she might find early signs of a uraemic state.

LETTERS, NOTES, ETC.

Haematocolpos

Dr. R. L. SONI (Burma) writes: The cases described by Dr. A. L. Craddock in the *Journal* of December 25, 1937, p. 1304), are evidently of "partial haematocolpos with haematometra." Haematometra in such cases is secondary, and follows the non-recognition of the haematocolpos. The condition seems to be rare in general practice. I encountered only one case during the last nine years, and that was recorded in the *Indian Medical Gazette* (1937, **72**, 93). This was in a Burmese girl, aged 15, in whom the presenting symptoms simulated dysentery. There was history of amenorrhoea and of two attacks of abdominal colic, each lasting three days, three and eight weeks earlier. The labia minora in their lower halves were found fused together to form a bulging pouch, which contained foul-smelling phosphatic deposits, probably derived from the ammoniacal decomposition of urine. The Müllerian duct for an inch or more in its lower part had failed to canalize. A regular dissection had to be carried out to arrive at the blind lower end of the vagina. The final result was good.

Treatment of Erysipelas

"R. E. N." writes: In his article on this subject (*Journal*, February 12, p. 346) Mr. John Hosford states that sulphanilamide "has a profound, sometimes dramatic, effect: the temperature drops to normal in forty-eight hours or less." There is a much more dramatic treatment which is safer and cheaper. In some twelve cases of erysipelas I have found that an injection of 10 c.cm. of boiled milk intramuscularly promotes a cure within twelve hours. In one case only I gave a second injection because the temperature had not entirely settled. It would seem that this treatment is too simple to be generally adopted.

Correct Footwear

Dr. FREDERIC SANDERS (Chingford) writes: Mr. S. T. Irwin (*Journal*, March 19, p. 649) is in error in stating that hallux valgus would not exist if the great toe were allowed freedom until the age of 10. In all children's shoes such freedom exists to-day, but the moment the child reaches adult size the shoe trade has nothing to offer except shoes costing thirty to forty shillings, usually stamped with some bone-setter's name! One of these days a Minister of Defence will call for statistics of recruits turned down for feet. He will then say to the Minister of Health: "In future, in addition to giving away milk you will provide for boys' shoes of a proper shape, and continue to provide them, in increasing sizes, for any 'old boy' who needs them, at *half the market value*." This will raise a howl of abuse from the manufacturers, who will then be told: "Very well, you provide shoes for the public at a reasonable price *made on our lasts* and we go out of business. Until you do, we stay in it." The whole problem of men's shoes would be settled in a fortnight. Women's shoes may safely be left to the lady doctors and to Mr. Bernard Roth, whose pious horror of a first-class actress in "sensible brogues" doubtless finds an echo in many an orthopaedic heart!

Supply of Tryparsamide

Messrs. MAY AND BAKER LIMITED (Dagenham, London) write: The references in the technical and lay press to the report of the Medical Research Council have been dealt with in a general way by a statement from the Association of British Chemical Manufacturers. We therefore wish to limit ourselves to the misunderstanding which has arisen, owing to the ambiguous wording of the Medical Research Council's report, in regard to the origin of tryparsamide. It is true that tryparsamide was discovered in America, in the laboratories of the Rockefeller Foundation, but it is entirely incorrect to suggest that the tryparsamide used in the Empire since 1925 has been of American origin. Since that date, we have supplied all the tryparsamide used here and in the Empire, and this has been completely manufactured in our factory. We are able to continue to supply all the tryparsamide required for use here and in the Empire.

Medical Aid for Barcelona

Dr. H. B. MORGAN, Chairman, Spanish Medical Aid Committee, 24, New Oxford Street, W.C.1, writes: The official casualty list published in Barcelona gives 1,300 dead and 2,000 wounded as a result of the terrible and continuous air raids last week. In addition over 10,000 people are homeless. We have decided at an emergency meeting to send help to the medical services in Barcelona. Apart from military casualties, which have inevitably been severe in the recent Aragon offensive, the Spanish Government is now called on to care for thousands of civilians wounded during intensive air raids on Barcelona and other cities. Bombs have been dropped on the most densely populated quarters, and the population, fleeing into the hills, are systematically attacked from the air by machine-gun fire. We have ordered ambulances, surgical instruments, and medical supplies, which will be sent out at once. This is, of course, in addition to the already heavy commitments for our established hospitals. Send us anything you can, however small, but send it at once.

Demonstrations of Physical Therapy Equipment

With the object of stimulating interest in physical medicine, a special series of demonstrations of physical therapy equipment were given last week at the showrooms of Stanley Cox Limited at 11, Gerrard Street, W.1. Although the demonstrations were given under commercial auspices, no "sales talk" was introduced, and an effort was made, with a physiologist in attendance, to interest medical visitors in the physical factors underlying this branch of treatment. The principal attention was directed to an apparatus named the "indolor," a painless stimulator for muscles and nerves, deriving its power from the alternating current mains, and designed to replace the Bristow coil. The cathode-ray oscillogram of the "indolor" revealed a beautiful wave-form, with no after-waves of the stimulus, so that the natural stimulating impulse of the nerve, and that only, is artificially reproduced. This was shown in contrast to the cathode-ray oscillogram of the Bristow coil, which is made up of a damped train of sine waves, each of which must cause a corresponding nerve impulse to be set up, and the impulses of each group other than the first can produce no further contraction of the muscle but may be a cause of pain to the patient, and account for the inconvenience often experienced in treatment by the Bristow coil. Ultra-short-wave diathermy was also demonstrated, and the characteristics of the energy generated by various systems were well shown.

Vicissitudes of a Leper

On February 28 death ended the astonishing career of John Ruskin Early, a North Carolina mountaineer, who, contracting leprosy some thirty years ago, spent the remainder of his life alternately being confined as a leper, escaping, or being released as apparently cured. The diagnosis was confirmed by Hansen, discoverer of the leprosy bacillus, and in 1917 a special "leprosarium" was built for him at Carville, Louisiana.

Dominion Dairy Products

During the present century science and the organization of modern transport have combined to bring to this country plentiful supplies of dairy products, meat, fruit, and other foodstuffs from all parts of the world. Nowhere has greater progress been made than in the provision of inexpensive yet high-quality dairy products by the oversea Dominions, which are to-day, according to the Imperial Economic Committee, responsible for half our supplies of butter and three-quarters of our requirements of cheese. Concurrently with the post-war increase in Dominion butter supplies, Britain's butter consumption has risen by more than 50 per cent., the average during 1937 being 24.7 lb. a head (or nearly half a pound weekly). The high and uniform vitamin potency of Dominion butter has been a subject of frequent comment. Typical of such observations is the statement made by the Ministry of Health's Advisory Committee on Nutrition in its report, *The Criticism and Improvement of Diets* (p. 5): "There is the possibility that butter may be devoid of vitamin D in winter and, consequently, if butter is being relied upon as a protective food, it would be best to specify butter such as New Zealand, which is fairly constant in its vitamin D content."

Correction

In the sketch of Alexander Skene, published on February 12 (p. 349), Long Island *Cottage* Hospital should read Long Island *College* Hospital. This institution recently celebrated the fiftieth anniversary of the founding of its Hoagland Laboratory, when Dr. Oswald T. Avery of the Rockefeller Institute for Medical Research spoke on "The State of Bacteriology Fifty Years Ago and To-day."